FOOD CULTURE AND HEALTH IN PRE-MODERN ISLAMIC SOCIETIES

EI REFERENCE GUIDES

VOLUME 3

FOOD CULTURE AND HEALTH IN PRE-MODERN ISLAMIC SOCIETIES

Edited by

David Waines

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PREFACE AND ACKNOWLEDGEMENTS

For a number of years, the medieval Arabic culinary tradition has occupied a significant part of my research interests and to a lesser extent my activities in the kitchen. As to this latter preoccupation, there was a fascination in trying to recreate a modern version of a recipe drawn from among a large corpus of medieval Arabic cookbooks which reflected the urban culinary interests in the Muslim Middle East from tenth century Iraq to twelfth century Andalusia (Spain) and North Africa to fifteenth century Egypt. Given quite limited skills in the kitchen, my intention had been to explore a novel way of entertaining friends to dishes from the past as no one would have any idea how they should taste. If a particular dish were judged a success, the venture could be repeated, but if it were deemed politely to be merely 'interesting' clearly further testing was recommended if not total abandonment of that specific dish. Later I became intrigued by the relationship between the Arabic culinary tradition and a branch of the medieval Arabic medical tradition, namely dietetics. Cookbook compilers frequently informed the reader on the nature and benefit of various foodstuffs together with occasional advice on how to rectify minor ailments such as a fever as well as providing recipes for dishes to enjoy simply for their own sake. Works on the benefits of foodstuffs and avoidance of their harm (dietetics) were usually composed by physicians who broadly followed a system of pathology adopted from the ancient Greeks while other writers were religious scholars who relied more upon the traditions related to food matters attributed to the Prophet Muhammad. In other words, cooks and quacks, were very much interested in what folk consumed on a daily basis; I sympathise with the intentions of both groups.

That is a rough sketch of the background to the editor's personal interest in the present volume. Except, that it would not have come to fruition had it not been for the proposal, indeed inspiration, of friend and colleague Maurits van der Boogert. It was an opportunity, too, to broaden the scope of my own particular interests to explore, for example, related subjects such as agriculture and irrigation. The volume is also, therefore, a tribute to the generations of scholars whose rich expertise contributed to the making of the second edition of the *Encyclopaedia of Islam* (a massive enterprise now into its third edition), which many times more the number of scholars over many years have been indebted for their own research. And finally but most pleasantly, it remains to dedicate this volume to another dear friend: Monique Hogenkamp.

David Waines

INTRODUCTION

The *Encyclopaedia of Islam* was first published in four volumes and a Supplement between the years 1913 and 1938, coming out in three languages, English, French and German simultaneously. Declared to be an encyclopaedia in scope, the more precise nature of the project was sub-titled *A Dictionary of the Geography, Ethnography and Biography of the Muhammadan Peoples.* In short, places, properties and persons. The First World War evidently made its own impact upon the publishing venture as the second volume only appeared in 1927, subsequent volumes appearing in 1929 and 1934, followed four years later by the Supplement. Hostilities notwithstanding, this was notably the first venture of its kind to bring together "a number of leading Orientalists" under the auspices of the International Association of the Academies to focus upon Muslim societies.

The acknowledged success of the project was marked by post-Second World War plans to publish a new, vastly expanded edition of the encyclopaedia, the first volume of which appeared in 1960. The intervening two decades between the first and second editions had, by good fortune, been marked by developments in academic research into a range of inter-related topics connected to the themes of nourishment and health in the medieval Muslim world. Today, these have become recognised areas of importance in historical studies generally and within the broader social sciences as well. However, at the time of the original edition, its scope did not include topics—within the editors' understanding of 'ethnography'—that would embrace 'food' as relevant to its many varied contexts. Hence, in contributions to "*EI2*" (to which it is now popularly referred) one can detect an increasing interest throughout its publishing span of over four decades to address this omission and the results form the basis for the contents of the present volume.

Nonetheless, within the broad spectrum embraced by the rubric Islamic and Middle Eastern Studies, the subject of **food as nourishment in the culinary tradition**, has belonged to a more recent and 'minor' academic tradition among Western scholars. By contrast, the study of health concerns or medicine in Islamic societies has enjoyed a longer standing Western academic interest and acknowledgment of greater merit, largely owing to the early adoption by Muslims for their own use of the Greek medical heritage of Hippocrates and Galen. For the purposes of the present volume the medieval Islamic medical tradition, although treated in a single overview article from *EI2*, will focus more narrowly on the fields of dietetics and pharmacology. These were recognised branches of medicine associated with **food and diet as a key therapeutic aid** to a general healthy regimen, and with vegetable or animal matter in **the preparation of 'drugs'** to combat an ailment and restore the body to its healthy balanced nature. This latter branch of pharmacology, or perhaps better, pharmacognosy (the knowledge of crude natural drugs) was also indebted to the Arabic translation from the Greek of Dioscorides' famous treatise *On Medical Substances*.

Commencing first with the theme of food as nourishment in the culinary tradition, we may better appreciate the contribution of the *EI2* to the subject by providing a brief survey of work done in the interval between publication of the first and second editions of the *Encyclopaedia of Islam* (roughly the years 1940–60) and then by noting more recent developments. It will become clear to interested readers that while much has indeed been accomplished, the overall picture remains somewhat patchy; that is to say, many present lacunae require the attention and efforts of both present and future generations of scholarship.

Modest beginnings

If one person could be identified as the founder of the academic tradition of the history of food in classical Arabic culture, it was Habib Zayyat (1871–1954). Using a range of Arabic literary and historical sources, Zayyat's output on food spanned twenty years, primarily during the 1930s. His articles appeared in the Jesuit journal *al-Mashriq* published in Beirut. Many are short but all contain information useful for research today. Arguably, his most important piece is entitled "Fann al-tabkh wa-islah al-at'ima fi l-islam" ('the art of cooking and preparing food in Islam').[1] Another interesting article treated table etiquette in Islam (1939) and among the shorter pieces there are discussions on spice bread, rice bread, Damascus apricot and Damascus apple all appearing in 1937, saffron (1938) and rose and rose water in Damascus (1952). It is true that other Arab writers had earlier published short articles on food such as Muhammad Kurd Ali's (d. 1953) "Ma'kal al-ʿarab" ('Arab food'),[2] but it was Zayyat who, in his edition of texts and articles introduced food as a subject of historical enquiry.

Among European scholars, Maxime Rodinson's pioneering work may have been directly inspired by Zayyat's concerns during the years 1940–47 that he spent as a young man in Lebanon and Syria. Among these studies is the often-cited "Recherches sur les documents arabes relatifs a la cuisine".[3] Indeed, in all his work Rodinson (d. 2004) employed his extensive knowledge of the languages and cultures of the Islamic and Western lands to explore the significance of food as a cross-cultural phenomenon.

In these early years a few other scholars pursued diverse paths in matters related to food history, even though often outside of, or in addition to their individual special areas of research. A.J. Arberry, for example, later known for his translations of classical Arabic poetry and studies on Islamic mysticism, translated a thirteenth-century Arabic cookbook, the so-called *Kitab al-tabikh* by Muhammad ibn al-Hassan al-Khatib al-Baghdadi that was published in the journal *Islamic Culture*.[4] The original Arabic edition appeared in 1934 and was re-issued in Beirut in 1964. Joshua Finkel, whose major research focus was the multi-faceted relationship between Judaism and Islam, produced a two part study and partial translation of a literary work entitled *Kitab al-harb al-maʾshuq*. The work itself was a fantasy account of a war between two comestibles, King Mutton and King Honey, and Finkel's analysis helped open the way for later scholars who aimed to engage a 'sociological' interpretation of texts on food.[5] A scholar who made important contributions to the field of Byzantine-Arab relations,

[1] Habib Zayyat, "Fann al-tabkh wa-islah al-at'ima fi l-islam", *al-Mashriq*, 41 (1947) 1–26.

[2] Muhammad Kurd Ali, "Ma'kal al-ʿarab", *al-Muqtabas*, 3 (1908), 569–79.

[3] Maxime Rodinson, "Recherches sur les documents arabes relatifs a la cuisine", *Revue des Etudes Islamiques* (1949), 95–165.

[4] A.J. Arberry (tr.), "Al-Baghdadi, A Baghdad Cookery Book (1226 A.D./623 A.H.)", *Islamic Culture* [13 (1939), 21–47 and 189–214.

[5] Joshua Finkel, "King Mutton, a curious Egyptian tale of the Mamluk period…", *Zeitschrift fur Semitistik und verwandte Gebiete*, Part I (1931), 122–148, Part II (1933), 1–18. A new Arabic edition has been prepared by Manuela Marin "Sobre alimentacion y sociedad (el texto Arabe de 'La Guerra Deleitosa')", in *al-Qantara*, 13/1 (Madrid, 1992), 83–122.

Marius Canard, chose rice as the subject of a major contribution to the topic of food consumption.[6] An expert on the *materia medica* of Dioscorides, Cesar Dubler, tackled the linguistic aspect of food terms in another two-part article.[7] Finally, we may mention the short piece by A.S. Fulton, "Firuzabadi's wine list".[8] Here, an unpublished manuscript by the famous lexicographer (d. 1415) is briefly described, providing a list of Arabic terms for wine which, including variants, number 357 items.

In the aftermath of the War, in July 1948, the plan for a major new edition of the *Encylopaedia* was presented to the Twenty-first Congress of Orientalists in Paris. It was approved and the project's realisation was assured with the support of the Royal Dutch Academy of Sciences, in collaboration with the learned societies and academies of Europe and America and, in the words of the Foreword to the *EI2*'s French edition, "des répresentants qualifiés des érudits de l'Orient." Volume One of this venture appeared twelve years later in 1960 and the second edition, including a Supplement, was finally completed in 2004.

A New Era

The new publication period began and continued in much the same way as before, except that contributions to food history appeared more clearly integrated within an individual scholar's overall research interests. One example is the important article by the social-economic historian Eliyahu Ashtor on food consumption.[9] Three articles by Rodinson reflect his continued involvement with "Notes de vocabulaire alimentaire sudarabique et arabe"[10] and his exploration into comparative history with "Les influences de la civilisation musulmane sur la civilisation europeenne medievale dans les domains de la consummation et de la distraction: l'alimentation".[11] Equally important is his lengthy essay on nourishment, "Ghidha", written for *EI2* (1965) and reproduced in this volume. The Spanish Arabist, Ambrosio Huici Miranda, anticipated the important contribution to food history that only culinary manuals (or 'cookbooks' in common parlance) can make. In the mid-sixties he published the text and translation of a unique, anonymous manuscript on Spanish-Moroccan cooking dating from the twelfth-century Almohad period.[12] This work complemented the translation by Arberry in 1939 of al-Baghdadi's Iraqi cookbook, so that culinary practices from distinct and distant parts of the Arab Muslim world were now available. More editions and translations would appear in due course.

In a new development, food matters found a place in historical monographs covering extended periods of time. Two examples are first, the major work of Rachel Arie on *L'Espagne musulmane au temps des nasrides, 1232–1492* (Paris, 1973) which includes a chapter on various aspects of private life, food briefly treated among them. Arie then enlarged upon the subject in an article "Remarques sur

[6] Marius Canard, "Le riz dans le Proche Orient aux premiers siecles de l'Islam", *Arabica*, 6 (1959), 113– 131.

[7] Cesar Dubler, "Temas geografico-linguisticos: I Sobre la berenjena, II Badea-Sandia", *al-Andalus*, 7 (1942), 367–389 and 8 (1943) 383–413.

[8] A.C. Fulton, "Firuzabadi's wine list", *Bulletin of the School of Oriental and African Studies*, 12 (1948), 579–585.

[9] Eliyahu Ashtor, "Essai sur l'alimentation des diverses classes socials dans l'Orient medieval", *Annales E.S.C.*, (1968), 1017–1053.

[10] Maxime Rodinson, "Notes de vocabulaire alimentaire sudarabique et arabe", *Comptes Rendus du Groupe Linguisique d'Etudes Chamito-Semitiques*, 9 (1963), 103–107.

[11] Maxime Rodinson, "Les influences de la civilisation musulmane sur la civilisation europeenne medievale dans les domains de la consummation et de la distraction: l'alimentation", *Atti dei convegno Internazionale(1969): Oriente e Occidente nel Medioevo: Filosofia e Scienze*, Roma (1971), 479–499.

[12] A. Huici Miranda, Kitâb al-Tabîkh fi 'l-Maghrib wa 'l-Andalus fi asr al-Muwahhidin: La cucina ispano-maghrebina in epoca almohade secondo un manoscritto anonimo (Madrid, 1965); A. Huici Miranda, *Manuscrito anónimo del siglo XIII sobre la cocina hispana-magribī* (Madrid, 1965).

l'alimentation des musulmans d'Espagne au cours du bas Moyen Age".[13] Second, Muhammad M. Ahsan's history of the *Social Life under the Abbasids* (London, 1979) contains a long chapter on food with sections covering the main comestibles, dietetics, rich and poor man's fare, markets, meal times and table etiquette. In this same decade there appeared the first monograph devoted entirely to the food of a specific region, namely, Tadeusz Lewicki's invaluable *West African Food in the Middle Ages according to Arabic Sources* (Cambridge, 1974).

Following upon Huici Miranda's cookbook edition there appeared another of Spanish-Moroccan provenance by a thirteenth-century compiler called Ibn Razin al-Tujibi. It was edited by Muhammad Ben Chekroun under the title *La cuisine andalou-marocaine au xiii*e *siècle d'apres un manuscript rare: Fadalat al-khiwan fi tayyibat al-ta'am wa'l alwan* and was published in Rabat in 1981.[14] The manuscript had first been brought to light by the Spanish Arabist Fernando De la Granja in 1960. Then, in 1987, Kaj Örhnberg and Sahban Mroueh published an edition of the *Kitab al-tabikh* by the otherwise unknown compiler Abu Muhammad ibn Nasr ibn Sayyar al-Warraq.[15] The editors judged that it belonged to the second half of the tenth century which made it the oldest cookbook in Arabic to come to light. Its contents reflected culinary practices under the Abbasid caliphs and the Baghdad bourgeoisie of a century earlier. Indeed, a case could be made for some of the dishes being the successors in style and substance to recipes preserved on ancient Assyrian cuneiform tablets called by the Assyriologist Jean Bottero "the oldest recipes of all".[16] This research progress on the culinary front was followed by the publication in Aleppo (1988) of a two volume work: one on the history of food in medieval Arab culture, the other a critical edition of the Syrian cookbook *al-Wusla ila al-habib fi wasf al-tayyibat wa al-tibb* by Ibn al-Adim (d. 1262), prepared by the Syrian scholars Sulayma Mahjub and Duriyya al-Khatib. This was the work that Rodinson had drawn attention to forty years earlier. Then in 1992 another cookbook, the *Kanz al-fawa'id fi tanwi' al-mawa'id* by an anonymous compiler, was published in Stuttgart and Beirut. Its editors, Manuela Marin and David Waines suggest the work is likely of fourteenth-century Egyptian provenance compiled during the Bahri Mamluk period.

Publication of printed editions of such important primary culinary sources liberates their manuscript versions from the libraries in which they are housed and makes them more directly accessible to researchers everywhere. Nonetheless, only Arabists could actually use these texts, and a further step in extending our knowledge of this valuable corpus of cookbooks is through their translation. This is doubtless what Arberry had in mind when he rendered al-Baghdadi's cookbook into English; for years it became one of the most often cited sources of information on medieval Arab food ways. It could be argued, however, that al-Baghdadi did not represent the best or most interesting example of the cookbook genre. Hence a welcome addition to our resources in translation is Nawal Nasrallah's recent rendering of al-Warraq's cookbook, published as *Annals of the Caliphs' Kitchens: Ibn Sayyar al-Warraq's Tenth-Century Baghdadi Cookbook* (Leiden, 2007). It is introduced by a survey of the period and its food culture, has an extensive glossary of food and general culinary terms and is beautifully illustrated with medieval miniatures in colour.

Another dimension of research, besides preparing editions of Arabic manuscript sources and translating them, is the crucial labour of synthesis, i.e. the preparation of a monograph that embraces the diverse results of others' research together with the author's own knowledge and insights that contribute to painting a broader canvass of a specific subject. For example, two studies in Ger-

[13] Rachel Arie, "Remarques sur l'alimentation des musulmans d'Espagne au cours du bas Moyen Age", *Cuadernos de Estudios Medievales*, II–III (1974–75), 299–312.

[14] A corrected and improved edition appeared in Beirut in 1984.

[15] *Kitāb al-ṭabīkh*, Ibn Sayyār al-Warrāq, ed. by Kaj Öhrnberg and Sahban Mroueh (Helsinki: The Finnish Oriental Society, 1987).

[16] Jean Bottero, 'The oldest recipes of all', in J. Wilkins, D. Harvey & M. Dobson (eds), *Food in Antiquity* (Exeter, 1995), 248–255.

man by Peter Heine are devoted to the vinicultural and culinary aspects of medieval Muslim Arab societies.[17]

The dissemination of knowledge of a particular field, indeed any field, is greatly assisted by cooperative or collaborative projects such as formal meetings like conferences or smaller, more informal sessions like workshops. Not only can participants exchange ideas on their favourite subjects within an area but all would expect their contributions to be published allowing even further dissemination of ideas to the wider public. In 1994 two books were published resulting from international meetings of like-minded scholars in Xativa, Spain and London, England: *La alimentacion en las Culturas Islamicas* edited by Marin and Waines (Madrid: Agencia Espanola de Cooperacion Internacional), and *Culinary Cultures of the Middle East*, edited by Sami Zubaida and Richard Tapper (London: I.B. Tauris).

As noted above, the study of Arabic medicine has been a subject of serious study among western scholars for much longer than there have been explorations into the culinary uses of food in Muslim societies. One may mention first the two volume treatise on *Histoire de la medicine arabe* of Lucien Leclerc (Paris, 1876) and in English there is *Arabian Medicine* by Edward G. Browne (Cambridge, 1921) and Cyril A. Elgood's *A Medical History of Persia and the Eastern Caliphate* (Cambridge, 1951) all of which are still useful. They have, however, been largely supplanted by Manfred Ullman's *Die Medizin im Islam*[18] and Felix Klein-Franke, *Vorlesungen über die Medizin im Islam* (Wiesbaden, 1982). More recently, these studies have now been complemented by the brief but excellent survey by Peter Pormann and Emilie Savage-Smith, *Medieval Islamic Medicine* (Edinburgh, 2007). Dietetics and pharmacology are treated in all of these works to a greater or lesser extent.

The subject of dietetics is also treated in books known by the short title *Kitab al-aghdhiyya* ('*Book of Nourishment*'), although their full titles are often more explanatory. For example, the Arabic work by Abu Bakr al-Razi (d. 925, known in Europe as Rhazes) could be rendered in English as *The Book of Nourishment's Benefits and the Warding off of its Harmful Effects.* It was published in Cairo in the 1870s but did not receive the attention it deserved from scholars, possibly owing to the later emergence of interest in specific food matters as we have argued above. The Institute for the History of Arabic Islamic Sciences in Germany, under the direction of Fuat Sezgin, has been active in publishing facsimile editions of manuscripts of as yet unedited Arabic works. In this way modern technology allows classical Arabic treatises to be disseminated more widely. Works in many fields have been issued which include medicine. One work on dietetics is the important *Kitab al-aghdhiyya* by al-Razi's Jewish contemporary Ishaq ibn Sulayman al-Isra'ili (d.ca. 935) that was published in facsimile in three volumes (Frankfurt am Main, 1986). The famous Andalusi polymath, Abd al-Malik Ibn Zuhr (d. 1162 CE), known in Europe as Avenzoar, also wrote a book on nourishment that was edited and translated into Spanish by Expiración García Sánchez.[19] A book on nourishment by the less known thirteenth-century author, Ibn Khalsun, has likewise been edited and translated into French by Suzanne Gigandet.[20]

Related to these, but expressing an explicit religious ethos, are works that belong to the genre called Prophetic medicine (*al-Tibb al-nabawi*). Drawing upon traditions from the Prophet, they offer advice on the benefits and dangers to one's health of a wide variety of food substances among other remedies. The earliest known work of this type, by the Andalusi, Abd al-Malik Ibn Habib (d. 852),

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[17] Peter Heine, *Weinstudien: Untersuchungen zur Anbau, Produktion und Konsum des Weins in arabisch-islamischen Mittelalter* (Wiesbaden, 1982) and Peter Heine, *Kulinarische Studien: Unterschungen zur Kochkunst im arabisch-islamischen Mittelalter* (Wiesbaden, 1988). There is now his *Food Culture in the Near East, Middle East and North Africa*, (Westport & London, 2004).

[18] Manfred Ullman, *Die Medizin im Islam* (Köln/Leiden, 1970); revised English version, *Medicine in Islam* (Edinburgh, 1978).

[19] *Kītāb al-Aḡdiya: (Tratado de los alimentos), Abū Marwān ʿAbd al-Malik b. Ẓuhr; edición, traducción e introducción por Expiración García Sánchez* (Madrid, 1992).

[20] *Ibn Ḫalṣūn; texte établi, traduit et annoté par Suzanne Gigandet* (Damascus, 1996).

is called *al-Mukhtasir fi 'l-tibb* and has been edited and translated by Camilo Álvarez de Morales and Fernando Girón Irueste (Madrid, 1992). Possibly the best known *al-Tibb al-nabawi* that also receives the name is by Ibn Qayyim al-Jawziyya (d. 1350). There are several Arabic editions[21] and it has been translated into English by Penelope Johnstone as *Medicine of the Prophet*. The subject has been also treated in monograph studies, two of which are Fazlur Rahman's *Health and medicine in the Islamic Tradition*, [New York, 1987] and Irmeli Perho's *The Prophet's Medicine: A creation of the Muslim traditional scholars* (Helsinki, 1995).

Pharmacology in the medieval Muslim world was about drugs and their preparation by specialists for use in counter balancing or combating the effects of common ailments and disorders. The substances that went into drugs were of vegetable, animal or mineral origin, but overwhelmingly they comprised plant ingredients. Some common ingredients such as the eggplant were to be found also in cookbook recipes. Methods of preparing drugs and utensils used were similar to those employed in the domestic kitchen to prepare the daily meal. Martin Levey composed the first general survey of the field in his *Early Arabic Pharmacology: an Introduction based on ancient and medieval sources* (Leiden, 1973). While still useful, there is now the more recent work by Irene Fellmann who edited the pharmacopeia of al-Qalanisi (ca. 1200)[22] and that of Oliver Kahl who has prepared editions and studies of pharmacological texts of two Christian Arab pharmacists, Sabur b. Sahl's *The Small Dispensatory* and *The Dispensatory of Ibn al-Tilmidh.* Both books contain valuable glossaries of terms in Arabic-English and English-Arabic. A short epistle, written around 1200 CE by the Jewish physician Yaʿqub b. Ishaq al-Israʾili, illustrates a mixture of material gathered together at the behest of a fellow physician who had remarked upon errors made by others in their profession. In fact, the account covers matters of nutrition, pharmacology and dietetics or medication illustrating the degree to which these topics were inter-related in practice.[23]

Mention must be made of the importance of treatises on agronomy or agriculture too. The region of al-Andalus (modern Spain) was especially rich in producing these works, and the first manuscript to be edited and translated into a European language (Spanish) was the lengthy *Kitab al-Filaha* by the Sevillian Ibn ʿAwwam about whom nothing is known.[24] The most recent agricultural treatise to be published is the better known Iraqi treatise *al-Filaha al-Nabatiyya* by Ibn Wahshiyya.[25] These works dealt with agricultural methods and techniques and as such provide a rich source of data on cultivated food stuffs for human consumption.

Religious and Literary Sources of Muslim Interest in Food and Health

Against the background of what modern scholarship has accomplished concerning our broad theme of nourishment and health, the topic must now be addressed as to how Muslim scholarship in the classical period (roughly from the beginnings of Islam in the seventh century CE down to the fifteenth century CE) constructed viewpoints and influenced attitudes towards the same theme. As with the preceding discussion, treatment must necessarily be sketchy.

The rigours of fasting and the pleasures of feasting or—expressed in unadorned terms—eating to live rather than living to eat concerned every Muslim from both religious and worldly motives. The urban cultured elite were able to express and access these interests through a variety of literary genres. The religious interest was founded upon Islam's sacred sources. These were God's own words in the Qur'an, and the traditions (*hadith*). Thus the Qur'an enjoined believers to "eat of the

[21] E.g. Aleppo, 1927; Cairo, 1978; Beirut 1983.

[22] Irene Fellmann, *Das Aqrābādīn al-Qalānisī: quellenkritische und begriffsanalytische Untersuchungen zur arabisch-pharmazeutischen Literatur* (Beirut/Wiesbaden, 1986).

[23] Oliver Kahl, ed. and trans., *Yaʿqub ibn Ishaq al-Israʾili's "Treatise on the errors of the Physicians in Damascus"* (Oxford, 2000).

[24] J.A. Banqueri, ed. and trans., *Libro de agricultura*, (Madrid 1802).

[25] T. Fahd, ed., *L'agriculture Nabateene*, 3 vols. (Damascus, 1993–1998).

sustenance your Lord has given you and render thanks to Him" (Qur'an, 34:15; 2:57). The verse expressed the essential core of Muslim belief and ethics: that whatever one possessed is granted by God, whether it is food (*rizk*: sustenance) or the means to produce it, such as rainwater that supported both plant and animal life. For this gift one should express gratitude (*shukr*) to God. Collectively, the natural world was one of God's 'signs' as described in the following verse:

> it is He who spread out the earth…and made two of every kind of fruit…There are in the land…gardens of vineyards, cornfields, palm trees in clusters or otherwise, all watered with the same water, yet We make some of them better for eating than others: these truly are signs (*ayat*) for people who reflect and reason (Qur'an, 13:3–4).

These signs functioned as a reminder of the Creator's majesty and mercy and to elicit humankind's worshipful response of gratitude. Alluding to food taboos, the Qur'an also stated that "eat of what is lawful and wholesome on the earth and do not walk in Satan's wake for he is your inveterate foe" (Qur'an 2:168).

By the ninth century CE, multi-volume collections of traditions (*hadith*) were being compiled by experts. Some of these traditions deal with the subjects of food and drink. Two of the best known collectors were al-Bukhari (d. 870) and Muslim (d. 875). In all, six collections of traditions achieved canonical status and were regarded as unimpeachable sources for the religious life among Muslims. In the tradition literature the Prophet's reported sayings and actions were used by religious scholars to elucidate, interpret or extend the meaning of passages in the Qur'an. Food taboos not mentioned in the Qur'an found their way into hadith collections. For example, the Prophet explicitly prohibited the flesh of the domestic ass although he partook of the flesh of a wild ass. On another occasion he accepted from a companion the hind quarters of a hare he knew had been ritually slaughtered. Although neither the hare nor the domestic ass is mentioned in scripture, the legal method of slaughter assured its cleanliness for consumption. The Prophet was further reported to have declared, "I neither eat nor prohibit the eating of lizards," leaving the individual believer to decide whether to indulge or abstain.

Later the great classic of religious thought and practice called *The Revival of the Religious Sciences* (*Ihya' Ulum al-Din*) was composed by Abu Hamid al-Ghazali (d. 1111). It contained a chapter on the etiquette of eating (*adab al-akl*), as did the *Book of Basics* (*Kitab al-Madkhal*) by the fourteenth-century Maliki jurist, Ibn al-Hajj. These works, too, are based upon sayings of the Prophet and prominent figures of the early Muslim community. The list of authors and titles in which the subject of nourishment is treated might easily be lengthened. Suffice it to reiterate that that food and drink touched the vital core of Islamic ethics. On the one hand, believers worshipped God through prescribed rituals (*ibadat*) of prayer, fasting, pilgrimage and the giving of charity, and obeyed scriptural prohibitions and followed injunctions to acknowledge one's gratitude to the Creator. God is described metaphorically as the One who "gives nourishment (to all) and yet is nourished by none" (Qur'an, 6:14). On the other hand, food and drink illustrate the sphere of social relationships (*mu'amalat*) as the faithful are enjoined to give from their own means, however much they are cherished, to care for parents and kindred, orphans, the needy, the wayfarer, the weak, and to liberate those in bondage (Qur'an, 2: 177).

The interest of the urban and urbane population in food lore was reflected in lengthy sections on the subject in each of two encyclopaedic works of a more secular nature: the *Choice Histories* (*'Uyun al-Akhbar*) by Ibn Qutaiba (d. 889) and the *Unique Necklace* (*'Iqd al-Farid*) of Ibn Abd Rabbihi (d. 940).

Geographical accounts are another type of source. For example, there is the work of al-Muqaddasi (d. ca. 990), who commented on the food resources of all the regions of the Muslim world he visited. Further, the extant cookbooks referred to above display the rich culinary traditions of the Middle Eastern bourgeoisie which spanned the regions from Persia and Iraq in the east to Morocco and al-Andalus (modern day Spain) in the west. The cookbooks are not just about the preparation of raw ingredients into a cooked dish for the table. They often suggest how kitchen hygiene and the knowledge of the nature of food stuffs contribute to sustaining a healthy life. The introductory

chapters of Ibn al-Warraq's cookbook, for example, discuss the importance of cleanliness in the kitchen and the bodily effects of foods viewed from the prevailing medical perspective of Greek humoral pathology. Thus lentils are described as 'cold and dry' producing blood that is high in unwanted black bile, as it tends to dry the body out, with the additional effect of curbing coitus. Mung beans, which are also 'cold and dry', are lighter than lentils but less nourishing. The point was to try and achieve a balance in the body between the competing natures of foodstuffs, so that, for example, 'warm and moist' substances would check the effects of 'cold and dry' ones. Other factors like climate, waking, resting and sexual activity also contributed to the maintenance of a healthy regime and bodily constitution.

In a second cookbook, the anonymous *Treasury of Benefits* (*Kanz al-fawa'id*) for short, there is a chapter entitled "Concerning a sick person's being nourished by vegetable dishes called *muzawwarat*" that offers a dish designated for those suffering from bilious fever. The term *muzawwar* literally means 'counterfeit' and refers to a dish which normally would be prepared with meat, but for an ailing person is made without meat but with only the usual vegetables and seasonings, spinach being a favourite of this type of 'false' fare.

Selection and Organisation of the Encyclopaedia articles

The advantage of compiling a work of this nature from *EI2* is that the selection of articles need not be limited strictly to its subject matter in the narrowest sense. In the present case, the subject is food for nourishment and health covering two distinct but inter-related traditions, the culinary and the (medical) dietetic. However, what does *EI2* have to offer readers beyond these relatively restricted topics, yet of relevance to them? What resources, for example, were available to medieval people, whether rich or poor, from which sustenance was drawn? Arguably, there could be no richer source of food for any human society than the land itself, and agriculture was the chief means of exploiting it. On the other hand, since water, like the air we breathe, is vital to life itself, they should perhaps be classed in importance before the land; yet as sources of food, air and water perhaps do not provide the range of basic foodstuffs that are drawn from the land. Another question: what methods were employed for the extraction of or gathering sustenance from these varied sources? In the arid or semi-arid zones of the earth where many Muslim societies were located, water provided by irrigation was essential for the growing of crops. Hunting game on land and in the air and fishing the waters of rivers, lakes and seas were practiced everywhere, apparently by all sectors of the population. Another ancient means of securing animal protein was found among nomadic communities of the Muslim world who lived an unsettled existence roaming and pasturing their herd animals. Part One of the present work is thus devoted to articles where these matters are discussed by international experts in their respective fields. Articles are often composite or multi-authored by experts on different regions or major cultural blocks such as the Arab world (sometimes further divided between eastern and western areas), Persia, India, Ottoman Empire and so on.

Attention is drawn here to the editor's essential intervention in each article. Intervention is basically of two kinds: first, the removal of the multitude of cross-references to other articles in *EI2* but not included in this collection, together with the multitude of bibliographical references in the body of the text and second, deletion of sections within articles of lesser or greater extent which do not, in the editor's judgement, add materially to the central focus of the volume as a whole. Had all the articles been retained in their original form, the volume would unnecessarily have been far longer, and certainly less coherent. The editor extends his sincere apologies to any contributor who may feel his or her essay has been unfairly or unjustly pruned.

Part One: Food Sources: earth, water and air

1. *Agriculture and Irrigation*

The opening article on **Agriculture** is a composite piece, individual sections dealing with the Arab Middle East and the Arab West (generally referring to modern day Morocco and the Iberian Peninsula), Persia, the Ottoman Empire and India. Each author's approach to his/her commission from *EI2*'s editorial board reflects the distinctive characteristics of the region and time span under examination. The section on the Muslim West highlights the rich agricultural literature in Arabic which was created and developed during the 11th and 12th centuries in the Iberian Peninsula. Ann Lambton's section on Persia notes the negative impact upon agriculture from disorders caused by human factors such as invasion, dynastic struggles and tribal conflicts as well as natural causes. These were not unique to Persia but could apply to other regions throughout the medieval period. Of note, too, is the late introduction of the potato into Persia (that spread to other regions), an ingredient that clearly would not have appeared in Persian cooking before the 16th century. Agricultural tools are also mentioned in this section, implements which, under different names, that would have their counterparts elsewhere. In the section on the Ottoman Empire, Halil İnalcık observes that a major problem in agriculture was the shortage of labour, not land, and hence the Empire's administration was characterised by direct state control of both peasant and the soil, a point not emphasised for other regions, suggesting the Ottoman administrative apparatus was more absolutist than its predecessors elsewhere in Muslim domains. Finally, agriculture in medieval India was said to be specially favoured by the fact that two crops could be harvested each year.

This wide ranging discussion on agriculture across the Muslim world may be completed by four short pieces on the most important grains grown. These will be preceded by three somewhat longer essays on other very important cultivated crops, the **Date palm, Sugar cane** and the **Olive tree**. The products of these crops and their place within the culinary spectrum of preparations will be discussed further below. Eliyahu Ashtor approaches the subject of **Wheat** as an economic historian and notes it was the main crop established in several varieties throughout the Middle East from well before the Muslim era. Commonly a victual's terminology could vary from one place to another. 'Wheat' in Egypt is called '*kamh*' while in Iraq it is '*hinta*'; another synonym is '*burr*'. The situation appears more perplexing in the domain of medieval cook books (on which more below). For example, a recipe for a meat dish called *hintiyya* ('wheaten' preparation) is actually made with rice (*aruzz*) cooked in milk and the meat. Another dish called *kamhiyya* ('wheaten preparation'), on the other hand, is indeed made with wheat (*kamh*). Terminological confusion is also found with regard to **Millet**, and while opinion was divided as to its nutritional value, it was believed to be an effective remedy against certain physical complaints. **Barley** was the second most commonly grown crop and widely used to make popular, less expensive bread than wheat-bread. Finally, **Rice** was more limited in its cultivation than wheat or barley, yet was a staple of the poor in rice producing zones, and in the cook-book world of the urbanite was used in a number of different dishes.

A short piece on the **Vine** is included here owing to the wide spread practice of viniculture in medieval Muslim lands given the multiple use of the grape—in spite of the Islamic attitude towards wine as a forbidden drink. Wine itself will be treated separately below.

The next article is also composite, dealing with water chiefly in the sense of **Irrigation**, making it complementary to the discussion above on agriculture. The separate sections cover the same geographical regions as in the preceding piece. Whereas Egypt was known as "the gift of the Nile", Iraq possessed two major rivers, the Euphrates and the Tigris, although there were significant differences between the Egyptian and Iraqi river systems. Persia had no such great waterways that traversed the land from one end to the other and depended far more upon a range of irrigation techniques involving, dams, weirs, wells and cisterns and the particular type called *kanat* that all influenced settlement sites and social patterns. Different again, India seemed to rely more heavily upon the seasonal monsoon rains. Like India, Egypt too was a two crop (winter and summer) country, the

former depending solely upon the annual inundation of the Nile, the latter upon artificial irrigation means. The important matter of water rights of access and use is also discussed by different authors. A notable feature of water use, whatever type employed, was the heavily labour intensive preparation and maintenance required to sustain a viable supply of water for agricultural output. An excellent illustration of this is the chief irrigation officer of Marw (in Persia) who had 10,000 workers under him, 'each with a specific task to perform', to keep the irrigation system in good condition. The organisation of these systems depended both upon the input of central and local authorities.

2. *Fish, sheep and goats*

The late F. Viré is the author of the two main articles in this section. The first deals with **Fish** and the second with **Small Livestock**, and is principally devoted to sheep and goats.

That branch of zoology specialising in the study of fishes, ichthyology, has enumerated more than 100,000 species worldwide. Over 3,000 names of fish species have been recorded for various regions of the Middle East ranging from the western Mediterranean basin to the Indian Ocean. Some names are curiously linked in Arabic to Biblical personages such as the *sultan Ibrahim* (Sultan Abraham) which is the red mullet. Others, like the grey mullet, bore the less distinguished name *buri*, well known from the Black Sea and throughout the Mediterranean. The famous 14th-century Moroccan globetrotter, Ibn Battuta, mentions in his travel account that the fish was something of a delicacy caught at Damietta in the Egyptian Delta and sold abroad. Recipes for the preparation of *buri* are found in cookbooks of Egyptian and North African provenance. On the other hand, Viré recounts the medieval Middle Eastern view that *buri* could cause gastric disorders resulting at times in major complications. According to yet other views, however, the flesh of *buri* together with honey might serve as a treatment for cataracts or again, when eaten with fresh onions, could act as an aphrodisiac. This is a graphic example of the way that in the medieval period an edible substance was believed to perform the multiple role of providing bodily nourishment while acting as a possible cure for a bodily disorder and, as with many other edible substances such as the coconut also acted as a sexual stimulant. Viré also touches upon the subject of the religious legal status of fish owing to its prominence in the daily diet.

The article on **Small livestock** covers a major source of the livelihood of both the pastoral nomad and sedentary agricultural populations. A polemic between the partisans of sheep and those of goats had its origins in pre-Islamic times, and continued thereafter, despite the Qur'an's equal treatment of both and the Prophet Muhammad himself declaring that 'prophets and just men were pastors of small livestock.' These animals provided food in several forms from their flesh to fresh milk and its several by-products such as buttermilk, cheese, whey (both to feed lambs and children and used in culinary dishes), fresh and preserved butter. Milk and its by-products were also produced, of course, from larger animals such as the cow and buffalo. Interesting, too, is that among the breeders of small livestock, the wool bearers when sheered, provided exchange currency for foodstuffs such as dates, sugar or flour. In the urban milieu of the leisure class reflected by the culinary manuals, meat dishes were common place. Most often, a recipe does not specify the meat to be used, but the expression 'take meat and proceed as follows…' is assumed to mean the most popular meat; mutton. Moreover, the fat of the sheep's tail was used in cooking although olive oil seemed the preferred medium. Nonetheless, according to Viré's judgement, sheep flesh in the Islamic domains did not achieve the importance it attained in 'feeding Western Christendom'.

3. *Forbidden flesh: the animal kingdom and the religious law*

Islamic law (*shari'a*) deals not only with the correct deportment of the believer before God and the proper behaviour to others in the community and beyond. In a few scattered but repeated verses, the Qur'an lays out a simple 'dietary programme'. Believers are enjoined to 'eat of what your Lord has given you and render thanks to Him' (Q 34:15) and 'eat of what is lawful and wholesome on the earth and do not walk in Satan's footsteps for he is your inveterate foe' (Q 2:168). Classes of

prohibited foods are briefly mentioned with little elaboration for '(God) has only forbidden you carrion, blood, pig's meat and animals over which any name other than God's has been invoked' (Q 2:173). Hence there was plenty of scope in later developments of the law for jurists to scrutinise thoroughly both scripture and, later, the Traditions (*hadith*) of the Prophet in order to clarify and elaborate upon these texts. C. Pellat had written a lengthy piece for *EI2* on the animal kingdom but only the section on **Animals and Muslim law** has been reproduced here. In Viré's article on Fish above, he dedicated a section to the licitness of fish to which the reader is also referred in this context. The other article treats the law's attitude to *mayta* (Illicit meat), the Qur'anic term for **Carrion**, one of the prohibited categories mentioned in the above verse. It is worth emphasising the Qur'an's repeated exception to the consumption of forbidden flesh: if believers found themselves in circumstances of dire necessity and life was endangered or in cases of coercion, then it was permitted to eat meat that was otherwise illicit. For example, the dog was regarded as fundamentally unclean and therefore forbidden to eat in Islamic law; moreover, the dog was in popular belief, of demonic origin. Yet early Arabic sources record that famine drove some tribes to eat dog flesh while later, in parts of North Africa, such deplorable consumption was even said to be habitual. Food taboos also acted as emblematic demarcation signs separating Islam from the two other so-called Abrahamic faiths, Judaism and Christianity. The camel, for example, was perfectly licit for Muslims and in Morocco was regarded as a repository of sacred blessings (*baraka*) and so to eat its flesh was an act of faith. Jews, however, considered the camel an abomination as its hoof is not cloven. In Islam the pig is judged to bear a major impurity and its flesh is thus forbidden, a prohibition inherited from the Hebrew Bible. Christians, by contrast, were released from this by Christ's abolition of the prohibition.

4. *Hunting*

In its widest sense, hunting embraced the numerous methods devised by human cultures for the capture of wild animals both on land and from the sea, rivers and lakes. The initial short discussion on **Hunting and Fishing** emphasises man's ingenuity in employing the most effective ways of achieving 'maximum return for least effort' in securing his daily sustenance.

The focus of the next piece shifts to a specific subcategory of the hunt namely, **Hawking**, or "the art of the flying hunt" which implied a wider sense than that of mere falconry. While it was a hunting sport practiced among the privileged classes, significantly it was also a source of livelihood among both rural and nomadic communities.

5. *Miscellanea from the world of fauna*

The editors of *EI2* commissioned many articles on individual species of flora and fauna of the various regions of the Muslim world. Our interest here is in a range of fauna species known throughout the medieval period. The articles selected reveal the often complicated terminology by which each was described, popular beliefs, superstitions and sayings related to the animal, whether individual species were sought for consumption (wild), bred for that purpose (domestic) which raised the question of its lawfulness or eaten only in constrained circumstances as 'famine food', and any other qualities it possessed, including 'medicinal'. A number of these were also written by F. Viré and a good example is the first piece on the **Hare**, much desired for its flesh. A delicious cold dish found in al-Warraq notes that roasted hare, the lightest of game meat to digest, should be chopped 'as fine as sesame seeds' and placed in a bowl and then dressed with a richly spiced sauce. In contrast, the Nile **Crocodile**, useful for certain medicinal purposes, was not only a very dangerous animal but owing to its *carnivorous* nature was legally out of bounds for consumption. The same would presumably apply to the carnivorous **Fox**, although the point is not made explicitly. The **Ostrich**, although legally consumable, was, at least among the Tuareg tribes of Morocco, subject to class preference: those of noble rank avoided eating it, but it was enjoyed by the lower orders including slaves. It might seem that the inclusion of **Ants** and **Locusts** in this context borders on the bizarre. Not so.

As to the former, ants were privileged (like the bee) in having a chapter in the Qur'an, named after them. Indeed, a tradition attributed to the Prophet Muhammad forbade the killing of four animal species including these two. But for all that, ants were expressly forbidden to be eaten. Locusts are also mentioned in the Qur'an, once in the form of a plague sent as divine punishment against a sinful, arrogant people (Q 7:133). For all the destructive power they could visit upon crops, according to ancient Arab norms they were proper fare for consumption. Muslim law also deemed these flying hordes lawful as food. It has been suggested, perhaps fancifully, that eating them was one means of controlling or eliminating their numbers; more likely, they were consumed of necessity by folk whose crops had been destroyed by their invasion. Nonetheless, a recipe for pickled locusts found its way into al-Warraq's cookbook the results of which were declared delicious. The opening instruction states that only live locusts could be used (the dead were discarded) and placed in salted water until they suffocated and died. The liquid was strained off and layer after layer of locusts, sprinkled with a prepared spice mix and salt were placed in a large jar; the strained brine was then poured over the layers until all were submerged and the jar tightly sealed to preserve them. The **Lizard**, too, was held in high regard as food among ancient Arab tribes and its consumption later became licit under Islamic law. Finally, the **Pigeon**, whose flesh was also permitted, was bred and kept almost as domestic pets throughout the Middle East.

Part Two: Food Resources and their transformation

1. *Nourishment and Beverages*

The second Part begins with the classic essay by Maxime Rodinson on **Nourishment**. As the Arabic term (*ghidha*) suggests, nourishment comprises ingesta which promote bodily growth and good health. As far back as the Hippocratic work *Tradition in medicine* the author observed that in the beginning man must have consumed the same food as the animals, all products of the earth; but as a diet of raw food caused much human suffering, means were eventually found to prepare raw resources in a manner better suited to humans' natural constitution. This ancient insight is reflected in the classical Arabic tradition. Here the labours of physicians who dealt with the medical concern for 'dietetics' (*al-aghdhiyya*, plural of *ghidha*) in detailing the benefits and potential harm of the raw resources of nourishment were mirrored in culinary works which described the transformation of these raw products through a variety of cooking techniques that produced healthy and satisfying dishes for the daily table. Thus we note again the convergence of the dietetic and culinary traditions. Rodinson's article is suitably wide-ranging. Food among pre-Islamic Arabs of the central peninsula is distinguished from that of the agriculturally richer southern Arabia; then the Arab-Muslim conquests brought about contact with other pre-Islamic food cultures throughout the Middle East, together with their adoption and later adaptation from them, especially the Persian and Turkish traditions. Of products consumed, attention is paid to their storage and preservation, preparation and distribution, followed by a longer section on the variations in food consumption between different groups of people. Religious regulations affecting consumption are also discussed and the article ends with observations on the aesthetics of food.

The next piece, **Drinks**, covers a variety of beverages such as beer, milk, water—both on its own and, a luxury, mixed with snow—and fruit juices, some of which were considered medicines or tonics. (The reader is once more referred to the section above on **Irrigation** in North Africa and Muslim Spain which deals with drinking water in these regions.)

Intoxicating drink is dealt with in two articles, each describing a different term for the beverage. The first is *khamr*, usually rendered as **Wine**. The legal aspects of wine are treated by A.J. Wensinck who shows how in the Qur'an its prohibition evolved rather than being forbidden outright at a single stroke. Jurists later forbade trade in the product as well and declared it the root of all evil. Dissenting opinion was expressed, basically in the query, 'what is wine'? for a beverage called *khamr* could be made from a variety of substances. The debate continued as witnessed by the evidence of

the traditions of the Prophet, Muhammad. Punishments for wine consumption are noted too. The second more comprehensive term for **Intoxicating Drink**, *nabidh*, is also mentioned by Wensinck and is dealt with briefly by P. Heine in the second article as well. One further well known drink made of fermented mare's milk is treated with extreme brevity by J. Boyle and the piece has not been included here; The beverage known as *kumis* (variant, *koumiss*) was the staple brew of the steppe peoples of Eurasia and is mentioned by Herodotus. The Franciscan friar William of Rubruck, who described Mongol life in the mid-13th century, also detailed its preparation: a large quantity of mare's milk was poured into a skin bag and churning the contents began with a 'stick which is as big as a man's head at its lower end and hollowed out; and when they beat it quickly it begins to bubble like new wine and to turn sour and ferment…' The good friar exclaimed that the resulting pungent liquid, 'greatly delights the inner man.' The medieval Moroccan traveller, Ibn Battuta, explained in his account to readers that Turkish imbibers, despite their being Muslim, adhered to the practice of the Hanafi legal school which, he claimed, tolerated its consumption.

One beverage was a late comer to the Middle Eastern scene but ultimately was to enjoy global fame. This was **Coffee**. Not an indigenous plant to the Yemen, it was probably introduced from Ethiopia and its earliest mention in Arabic sources dates from the 16th century, although its actual use may have occurred earlier. According to legend, the use of the plant, whether the berry alone or the prepared decoction, was popular among circles of Muslim mystics in the Yemen and Cairo. Fondness for the brew was owed to its effects as an aid to dispelling sleep and the performance of nocturnal spiritual exercises. Opponents, however, condemned its use as an 'intoxicant', forbidden by religious law, although their wrath may have been directed more specifically at the alleged unseemly behaviour of the mixed clientele in public 'coffee houses'. The leaves and young shoots of the *kat* (*khat*) shrub grown in east Africa and the Yemen, contained an alkaloid katin that produced a euphoric effect when chewed or drunk as a 'tea'. The widespread use of this stimulant had predated the appearance and use of coffee which displaced it in popularity in the Yemen until coffee began to be exported in large quantities.

The other beverage of modern global impact, tea, had a rather different history within the Muslim world. In the first half of the 11th century the famous scholar al-Biruni described *cay* but only as a plant grown and used in China. European merchants brought tea to Morocco in the 18th century while in Persia in the early 19th century a major shift in public taste occurred from coffee to tea, neither of which was yet cultivated in that region and in towns the coffee-house (*kahwa-khana*) came to serve tea only.

2. *The Kitchen, cooking and some preparations*

The following two articles are related as they discuss in general terms the place where and the processes used to transform the raw ingredients of the human diet into nourishing fare for daily consumption. The first, on the **Kitchen**, is a composite in four parts, the third part of which that covers Persia appearing in the Supplement. The other parts deal with the medieval Caliphate, the Ottoman Empire and Mughal India. The separate sections, however, differ in focus and treatment. One reason for this difference is the nature of the source material available to the researcher. The food culture of the medieval Caliphate is informed by a remarkable treasury of recipes found in Arabic culinary manuals (or more informally, 'cookbooks') dating from roughly the 10th to 15th centuries. In provenance the works range from Iraq, through Egypt to Morocco and the Iberian Peninsula. Replete with recipes for main dishes, side dishes, condiments, drinks and so on, these works also yield a rich vocabulary of the utensils employed in their kitchen preparation. The social milieu suggested by these cookbooks is that of an urban leisure class that reflected to some extent the tastes of court circles as well. In sharp contrast, the sections on the Ottoman Empire and Mughal India focus directly on the imperial households and those of the ruling elite whose kitchens were miniature replicas of the ruler's establishment. During Ottoman times, the Sultan's kitchen as a social institution "served to establish and symbolise patrimonial bonds in society." In Mughal India

from the rule of Akbar onward, when historical data becomes more abundant, a similar pattern emerged. In neither context, however, whether Turkish or Indian, is our knowledge informed by surviving cookbooks but rather by data from more 'official' sources which describe the ruler's custom of 'feeding one's people' as institutionalised within the state apparatus. A major source for Mughal history lists ingredients of numerous dishes prepared for the Imperial table but not the processes involved in their preparation. The same source reflects, too, the degree of influence of native Indian food culture upon the imported Persian-Turkish food tastes. The section on the Persian kitchen is more wide ranging in detail than the others. Two extant cookbooks mentioned date only from the 16th century both likely composed for fellow professional colleagues at court. Two interesting differences are noted between Persian cuisine and those of neighbouring Arab Muslim cultures: 1) the virtual absence of olives and olive oil, common throughout the Mediterranean cultures, whereas in Persia animal fat was employed instead and 2) the prestige rank of rice in Persian cooking (eaten only irregularly by the poor) whereas in rice growing areas like southern Iraq, it was consumed by, among others, members of the Sufi orders.

The next article is a survey of the techniques of **Cooking**. It deals chiefly with processes derived from the medieval culinary manuals mentioned above. A number of dishes are cited and a recipe for one well-known favourite, *zirbaj*, is given there. Cookbooks, however, were not merely guides to food preparation for pleasure at table; they were equally concerned with bodily hygiene. For example, a certain type of dish made without its usual meat component and called *muzawwar*, literally meaning 'counterfeit' because it resembled the original meat dish, was said to help persons suffering from fever.

A few other preparations are described in separate quite brief articles that appeared in *EI2*. **Yoghurt**, common throughout the Middle east and South Asia in slightly different forms and under different names, originated among the Turkish pastoralist peoples of Central Asia. **Clarified Butter** (*samn*) was employed in the kitchen but not to the extent that olive oil was used, especially in the Mediterranean areas of the Near and Middle East. **Hays** was a sweetmeat of ancient ancestry, consumed wherever dates were plentiful. It was said to have been served at the wedding dinner of the Prophet Muhammad when he married Safiya. It was commonly prepared by mixing dates with clarified butter and dried curd. More elaborate preparations, using sesame oil and nuts, were made to suit urban tastes. As it lasted well, *hays* was also convenient and nourishing for travellers. **Sawik** was also a very traditional preparation and recommended, too, for travellers. On the final stage of his first pilgrimage to Mecca, Ibn Battuta's caravan passed through a sandy defile called Sawik in western central Arabia. In his travel account he reminds his readers of the famous occasion the Prophet Muhammad once passed here with his companions only to discover none was carrying any rations. The Prophet then scooped up a handful of sand and offered it to the group who discovered it had 'miraculously' been transformed into a kind of gruel called *sawik*. Ever since this event, Muslim pilgrims to Mecca have stopped at this place to be fed *sawik* mixed with sugar by the caravan managers. **Sikbaj** and **Madira** were both well known dishes and recipes for each from different cook-books reveal interesting variations. One Sikbaj recipe calls for fatty meat, seasoned with a little salt and cinnamon, dried coriander, with onion, leek, Syrian garlic and carrot; peeled eggplant is cooked in salted water in another pot which is then added to the meat together with a further choice of spices. When the dish nears the end of its cooking, vinegar, bee honey and *dibs* (a sweet, thickened paste made from grapes or dates) are added in proper proportion to balance a sweet and sour taste. Chopped walnuts, dried figs and raisins could be added on top to finish off. Next, there is the famous North African Berber creation, **Couscous**, made from semolina, and which was a staple accompaniment with meat and vegetable dishes; so important was it considered to be, that in places it was referred to simply as 'food' (*t'am*) or, like the alternative word in Egypt for bread, 'life' (*'aysh*). And speaking of **Bread**, C. Pellat's essay closes this section describing the quite complicated product that it is with regional, social, cultural differences reflected in the multiplicity of bread types. The word for bread in Arabic—*khubz*—suggests also its original shape as the verb *khabbaza* means 'to flatten'.

3. *Spices, seasonings and other ingredients*

'Spices are difficult to define,' declares the author of the article on the same in Davidson's *Penguin Companion to Food* (2002). One approach proposes that spices are the dried parts of aromatic plants, their rhizome, root, bark, flower, fruit and seed. Authors of medieval Arabic texts attempted to classify aromatics with problematic results, as A. Dietrich shows in his piece on **Spices** (*al-afawih*, singular *fuh*). One suggestion he cites, however, seems to capture the underlying intention of using spices in cooking as *masalih al-ta'am* which literally rendered would be adding 'food improvements', food-flavourings, or simply, spices. The same description could be used to define herbs as well. A chapter heading in the earliest extant Arabic cookbook of the 10th century reads, "Spices (*al-abzar*) and aromatics (*al-'itr*) used to season/perfume (*yutayyib*) the cooking pot." Note that in this chapter heading two more words, in addition to *al-afawih*, are used for aromatic spices. **Salt** is included in its list of spices; another source called it 'the king of spices'. Although it was not added alone to the cooking pot to 'perfume' the dish, its use by itself was certainly justified in the sense of 'improving' its taste. A prepared mixture of salt and other spices, however, was known as 'perfumed salt.' A recipe for such a mixture contained sumac, dried pomegranate seeds, asafoetida root and its dried leaves, the seeds of sesame, nigella, hemp, flax, cumin, and green terebinth berries, each toasted separately and added to salt while they are still hot. From the same cookbook another recipe claimed a direct medicinal purpose to treat conditions like 'gout, hemiplegia, facial paralysis, arthritis, diseases caused by cold and humidity and spleen-related ailments'; it was also a purgative.

A second important point made by Dietrich is that most if not every spice performed, in addition to its culinary role, that of a medicament. Examples are given in the following articles supplemented here by information drawn from the culinary manuals. **Cinnamon** is one such substance whose aroma or scent derives from a volatile oil extracted from the bark of the plant. The Arabic and Persian terms indicate its Chinese origin and refer to cassia, a related but inferior spice and hence sometimes called 'bastard' cinnamon that is often confused with *kirfa*, the true cinnamon from Ceylon. This same aromatic quality was widely used in prepared dishes for the table where it was often employed along with other scented spices like ginger, mastic or saffron. The author of **Mint**, A. Dietrich, notes that its Arabic nomenclature is both abundant and confused; it appears in the *EI2* under the lemma Fudhandj and is described simply as "mint" (*mentha* L.). Lev and Amar note that medieval plant classification differed from its modern counterpart and hence it was common for there to be collective names for a group of similar species. Fudhandj, therefore, is in their judgement the collective name for various species of aromatic plants mainly of the Lamiaceae family. Curiously, Dietrich omits mention of mint's most common name in the culinary works, *na'na'* (*mentha sativa*). On the evidence of the anonymous Egyptian cookbook, mint was a very popular aromatic, used in preparing mint vinegar and other condiments, sauces, drinks and as one of several spices flavouring meat dishes. **Sandalwood** (*sandal*) would seem a peculiar ingredient to find in a cookbook, yet it was reckoned a spice according to one classification. Setting aside its meaning in Morocco for thyme or mint indicating it was a food item, it was also known for its medicinal applications. As we have seen, however, cookbooks were not always restricted providing recipes for the table; matters of minor ailments or bodily imbalance were important too. And part of maintaining the body's proper equipoise was creating an agreeable household ambiance; hence the desire for pleasant smells in one's daily surroundings. Unsurprising then are recipes in certain cookbooks for preparing incense and scented powders, even perfume which stimulated sexual desire; all these contained sandalwood and other aromatics like aloes, rose water and musk. **Dill** may be treated together with **Fennel** (*basbas*) as they both belong to the parsley family; both have medicinal uses. It is therefore interesting to discover in the earliest extant cookbook compiled by al-Warraq, a 'counterfeit' meatless recipe recommended for people suffering from pleurisy. It is brief and reads as follows: "Take the tender tips of fresh coriander, *parsley* and *dill* as well as sesame oil and water. Make a stew with them. When it is done, add a small amount of *fennel* seeds and ajowan seeds. The three related ingredients appear in this preparation and the term used for fennel is its common synonym, *razyanaj*. **Myrtle**, a fragrant evergreen shrub, is said to have been used mainly as a medicine. In al-Warraq's culinary

manual, myrtle berries appear prominently in a recipe for those with diarrhoea caused by an excess of yellow bile. First a chicken, lark and sparrow were cleaned and stuffed with the mixture of toasted, pounded, pomegranate and coriander seeds combined with myrtle berries and sumac. The birds are then cooked in myrtle berry vinegar, sour juice of unripe grapes and sour pomegranate juice. "It is beneficial", the recipe concludes—"God willing." **Camomile** does not seem to have had a place in table preparations and the article mentions its use as an infusion taken externally as compresses and rinses. This so-called "Camomile tea", however, is an infusion also taken internally like regular tea and widely drunk in the Arab world.

Rose water (*ma' al-ward*), discussed by F. Sanagustin, is described purely in terms of its uses in pharmacology. It is the distilled product of the damask rose. Consulting the Arabic cookbook of probable 14–15th century Egyptian provenance, there are found an astonishing number of ingredients employed in recipes, some four dozen in all, of the 'water'- type, whether the expressed, macerated or distilled liquid of raisins, pomegranates, saffron, grapes, apples, and so on intended for the cooking pot and not for healing purposes. The single most important 'water'-type ingredient by far, however, was rose water used for the aromatic qualities it lent to the prepared dish. **Musk**, by contrast, is not of plant origin but is the secretion of a gland of the male musk deer and which held an important place in medieval medicine. From the same Egyptian cookbook, we find musk widely used in culinary preparations, at times together with rose water; there is even a recipe for the distillation of the two together which could then be added to a dish as a single ingredient.

One of the medieval culinary rules of thumb was that dishes prepared for the table had to exude a pleasant, inviting smell for those partaking in the fare. A second rule centred upon taste or flavour and apart from 'plain' dishes which were seasoned but not with aromatics, there was a keen delight taken in dishes with a delicate but not overpowering sweetness or else a sweetness balanced by a subtle sour flavour, most often provided by vinegar. Two common sources of a sweetening substance, in both kitchen and medicinal preparations, were derived from the honey **Bee** and **Sugar** cane. In the kitchen, sugar may have been somewhat the more popular of the two, while in the books on *material medica*, the term 'honey' could encompass bee honey and other similar substances made from carobs, grapes and dates, the latter two used to make types of the sweet, thick syrupy *dibs*. Some kitchen recipes indicated sugar or honey could substitute for one another. A recipe for a (sweet-sour) beverage found in the anonymous Egyptian cookbook and intended to be both refreshing and healthy was made from lemons, honey and sugar and seasoned with mint and rue. Dates, when ripe, were also soft, moist and sweet and could be made quite delectable by drying the fruit, stuffing them with walnuts and dipping them in melted honey scented with rose water and saffron. Further uses, culinary and medicinal, for **Saffron**, are noted in the next article.

Clarified butter has been mentioned above as a cooking medium. The expressed juice of the **Olive** was the preferred medium across the Middle East and the Arabic term for it, *zayt*, was at times loosely extended to mean other vegetable oils as well. *Zayt* was also classified as a 'spice'. The compiler of the surviving 10th-century cookbook, al-Warraq, notes the effect on fatty meat of frying it in olive oil. Fatty meat itself was hard and slow to digest but was very nourishing; it was certainly more difficult to digest than meat cut up and grilled over the fire. Fried in olive oil, however, meat was even lighter and hence easier to digest. Olive oil was also used to bind ground seasonings together before adding them to the cooking dish. **Sesame** appears in a recipe for 'seeded' bread in both the form of oil and as seeds combined with pistachios and walnuts. In another preparation the oil was also used to 'grease' the treated copper tray upon which small pastries were placed in the oven to bake.

The final articles in this section concern fruits, the **Fig, Apple, Orange, Apricot** and **Raisins**. The fig occurs in a few kitchen recipes but seems best known for its laxative power. The early 10th-century cookbook recommends the best way to take figs is to consume them with walnuts in order to produce sound nutrition. An amusing equivalent of this combination may be found today in Istanbul's famous spice market where figs stuffed with walnuts are sold to tourists as Turkish Viagra. The apple (*tuffah*) occurs in more recipes than the fig and even has a dish named after it, the *tuffahiya*.

One version calls for meat, sweet apples, sugar and vinegar and seasoned with pepper, ginger, mint and saffron. The orange came in sweet, sour and sweet/sour varieties but they are not distinguished in the cookbooks. The use of oranges as whole fresh fruit was likely more common than in preparations (unlike lemons) since in the few existing recipes the orange blossom, peel (fresh and dried) and the leaf were also employed. Like the apple, the apricot (*mishmish*) has a cooked dish named after the fruit (*mishmishiyya*). One preparation calls for chicken cooked in macerated and strained apricot liquid seasoned with chopped onion, coriander and rue together with sticks of galangal, cassia and root ginger. A common use of raisins, apart from those mentioned in the article, was for making a fish sauce. One such recipe came with a royal pedigree as it was said to have been taken from the cookbook of Ibrahim ibn al-Mahdi (d. 839), a gourmet prince of the Abbasid dynasty, half brother of the famous Harun al-Rashid and himself erstwhile Caliph for a few brief weeks. This preparation required raisins soaked in vinegar then crushed, to which was added a small quantity of garlic. One measure of this mixture was added to another equal measure of vinegar, walnut and mustard combined with the leaves and roots of asafoetida, cassia, caraway and aniseeds.

4. *Food and Culture*

As a religious tradition and a movement of conquest, Islam emerged from western central Arabia, the Hijaz, in the mid-seventh century. With the rise and expansion of Muslim rule from the seventh through the tenth centuries, first northward into Syria, then eastward towards India and westward towards Spain there came a rich, multiple and varied inheritance based upon the conquered lands. Compared to the relative scarcity of their own native environment, the Arab conquerors discovered lands of plenty in the great river valleys of the Nile, the Tigris-Euphrates and the Indus together with the established technologies of agriculture and irrigation of these and other regions. In contrast with the basic dual source of Arab nourishment, the date palm and the camel, they encountered in abundance the famous triad of the classical world, wheat, the grape and the olive.

This contrast of environments is reflected in early Islamic dietary laws. Of the four schools of Sunni legal practice, the Shafiʿi, Hanbali, Hanafi and Maliki, only the last originated in the Hijaz cities of Mecca and Medina where the nagging reality of scarcity (and possibly hunger) were of more pressing concern than in the more richly cultivated centres of Iraq, Syria and Egypt. Hence, legal scholars of the Hijaz were alone in their attitude to the consumption of birds and beasts of prey; they permitted the eating of birds of prey while merely disapproving beasts of prey whereas the scholars of all other schools strictly prohibited the consumption of both categories.

With the Muslim expansion and as roots were set down in the conquered territories, new customs were encountered, new ways of doing things. One such novelty was the variety of indigenous culinary traditions that were expressed to some extent in the appearance of cookbooks written in Arabic for the new urban leisure class as discussed above. Another sphere was, in the broadest sense, a medical tradition also of composite nature but ultimately reflecting the Greek corpus of writings represented by Hippocrates as reworked and developed by Galen, and then notably the compendium on *material medica* by Dioscorides. The transmission of this knowledge was accomplished, as will be seen in Part Three, by a major translation movement into Arabic. This is not to forget, however, that in addition to the Greek legacy other influences reached the Arabs from Sassanian Persian, Syriac and, albeit only marginally, from Indian and Chinese sources.

On the other hand, Muslims made contributions of their own to the new, evolving trans-cultural domains of Islam that stretched from the Iberian Peninsula to India and beyond. Two may be noted briefly here as they are both related to the food cultures of Muslim societies. The first was the encouragement given during the early Muslim era to the diffusion of a number of crops from India through Persia westward across the Middle East and North Africa. The crops included sorghum, sugar cane, banana, spinach and the eggplant described by Andrew Watson in his book *Agricultural Innovation in the Early Islamic World* [Cambridge, 1983] together with the routes and mechanics of diffusion and their acclimatisation in new environments.

The second contribution may be described as an ethic of hospitality based upon scripture, the Qur'an, and supported by traditions attributed to the Prophet Muhammad which in turn may well have been derived from pre-Islamic Arab values. Since the *EI2* has no article specifically dealing with this important aspect of Muslim cultures, recourse has been made in this instance to a companion work, the recent multi volume *Encyclopaedia of the Qur'an* in six volumes under the general editorship of Jane Dammen McAuliffe [Leiden: Brill, 2002–2006]. The article is entitled **Hospitality and Courtesy**. The spirit of the ethic is captured in the Prophet Muhammad's saying when he was asked to describe the essence of Islam. He replied "Offering food and extending a greeting of peace." And with that we bring this brief interlude to an end and turn now to the field of medicine.

Part Three: Medicine: dietetics and pharmacology

1. *Greek into Arabic*

The Arab conquerors brought with them a further, significant contribution and this was to the historic, multilingual complex of the Middle East. They brought their own language, Arabic. In the words of Dimitri Gutas in his article on **Translation**, this was, as Greek had been, "yet another language with universalist claims", especially so once the Umayyad Caliph Abd al-Malik ibn Marwan (r. 685–705) had decreed in Damascus that Arabic would be the official language of the administration of the new Muslim political order. Henceforth, translations from the Greek and Syriac into Arabic became an inevitable, if only periodic, necessity. Later, under the Abbasid dynasty in Baghdad, translation from Pahlavi was added and a movement of historically important proportions created. Of concern here especially were the works of ancient Greek science, especially its medical corpus. The translation movement—lasting about two centuries—achieved success first, by making "Islamic civilisation the successor to Hellenistic civilisation" but also by ensuring the latter's survival until its later re-appropriation into medieval European scholarship.

In the article on **Medicine**, Emilie Savage-Smith also refers to the importance of the translation movement of the Abbasid period that was heavily patronised by rulers of the dynasty and other prominent persons. Interesting in this context is the figure of Abu Zakariyya Yuhanna Ibn Masawayh (d. 857). As a Nestorian Christian he had access to the *Sixteen Books of Galen* that had formed the core of the medical curriculum of the ancient school of Alexandria in Egypt. Although he was not known for direct participation in translating Greek sources, he did compose works of his own that reflected contemporary concerns. An expert in practical medicine he wrote monographs on drug remedies and dietetics among other subjects. Similarly, a physician from the earlier Umayyad period called Masarjawayh, who may have been Jewish, is credited with two books, unfortunately not extant, on the benefit and harm of foodstuffs and on the benefit and harm of medicinal drugs.

The first great translator from the Greek was a student of Ibn Masawayh and also a Nestorian, **Hunayn ibn Ishaq al-Ibadi** (d. ca. 875). His translations were not restricted to medical subjects, although his original compositions were chiefly medical, indicating a special interest in opthalmology. Two similar works written for medical students were an *Introduction to Medicine* and *Questions on Medicine*; in both he outlined the prevailing explanatory medical principal, known today as humoral pathology, that had been transmitted from **Galen**'s (d. ca. 200) refashioning of the corpus attributed to **Hippocrates** of the mid-fifth century BC. The idea was that *all* things, above all the human body, were composed of four '*elements*': earth, air, fire and water and consisted of four '*qualities*': hot and cold/dry and moist. Food and drink by their nature also comprised these same elements and qualities and the physician's training involved mastering the attributes of each substance including those of simple and compound drugs. As food and drink were digested—literally "cooked"—in the stomach, they were converted into four '*humours*'—also described as 'juices' or 'fluids'—which, in a healthy person were in relative equilibrium. If there was an excess or deficiency of a humour, the balance was upset and resulted in illness associated with the affected humour. The humours were blood, phlegm, yellow bile and black bile and each had a corresponding 'temperament' known as

the sanguine, phlegmatic, choleric and melancholic. Each humour was linked also to one of four 'elements', earth, air, fire and water, and to two of the four primary 'qualities', hot or cold/dry or moist. What flowed in a person's veins was a mixture of blood together with yellow and black bile; phlegm was discharged from the body in different ways. A body with a harmful excess of black bile, for example, would be described as melancholic and require a *counterbalancing* treatment through various means to restore a condition of approximate equilibrium. For example, if the 'qualities' of the melancholic condition were cold/dry, the 'qualities' of the treatment would need to be hot/moist. Health could be restored and maintained as well by the adjustment of what were known as the 'six non-naturals', that is, factors *outside* the body over which a person had, or could have, some degree of control. These six included 1) the air and surrounding environment, 2) food and drink, 3) sleeping and waking, 4) exercise and rest, 5) retention and evacuation (including coitus) and 6) mental states such as joy and grief. Hence, the cause and nature of illness could be diagnosed by resort to the humours and the six non-naturals while the same theoretical framework informed the appropriate treatment of a given ailment.

We can now better understand the title of a work by Ibn Masawayh, *Kitab al-azmina*, 'The book of seasons', as a description of the various seasons of the year based on the twin notions of humours and qualities. Another Nestorian physician of the ninth century was **Yuhanna ibn Sarabiyun** who wrote a medical compendium in Syriac; he was criticised by the later great medical writer ʿAli ibn al-Abbas al-Majusi (d. ca. 990) for limiting therapy to medicaments and diet while ignoring surgical treatments, although this was still a minority opinion. **Kusta ibn Luka** al-Baʿalbakki (d. ca. 912), gifted in many subjects including astronomy and music, wrote a work on the four humours. Certain non-naturals were dealt with in works by an Arab physician of the same century, Ibn Abi al-Ashʿath (d. ca. 970) such as a dietary treatise entitled "On food and those who feed themselves" and "On sleeping and being awake". The contemporaries, **Abu Bakr** Muhammad ibn Zakariyya **al-Razi** (d. ca. 925) and Abu Yaʿqub Ishaq ibn Sulayman al-Israʾili (d. 935) each wrote a treatise on dietetics called *Kitab al-Aghdhiyya*. They were but following the example set by the great Hunayn ibn Ishaq himself who had also written on food, diet and regimen in general these being at the forefront of therapeutic strategy which highlighted the techniques of non-intervention.

Given that the twin bases for promoting a sound and healthy constitution were humoral theory and the six non-naturals, especially the category of food and drink, it becomes clear why culinary manuals often go beyond mere presentation of recipes of dishes for the pleasures of the table. For example, al-Warraq's culinary manual presents cooking ingredients in terms of their humoral qualities. Coriander is described "cold and dry and has the property to keep food in the stomach until it is completely digested. Therefore, it should be taken sparingly if dense foods are eaten with it." Spinach is "moderate in properties; it is good for the throat, lungs, stomach and liver. It is a laxative and a good and commendable source of food." Prepared dishes, too, are mentioned in terms of a specific aid they may provide the eater. Al-Warraq offers a number of these, one a stuffed fish preparation that was declared "a tried-and-true cure" for jaundice. It would appear that the compilers of cookbooks had a working knowledge not only of the medical sub-discipline of dietetics but also of the more prominent medical sub-field of pharmacology expressed in the title of al-Biruni's famous late work on the subject, *Kitab al-saydala fi'l tibb, The book of pharmacology in medicine*.

In Dietrich's brief article on **Pharmacology**, he cites the observation of al-Biruni (d. ca. 1050) that the highest rank in the field is attained by acquiring the knowledge of the "effects of the simple medicaments and their specific qualities". Muslim pharmacological scholarship was based upon the translated works of Galen and of **Dioscorides**' earlier *Materia Medica.* This latter work contained around one thousand entries recording each plant, animal and mineral substance according to its individual properties, the majority belonging to the plant kingdom. Galen refined the system by giving each simple medicinal drug a pair of primary qualities (warm, cold/dry, moist) and a degree of intensity from the weakest (1) to the strongest (4). Simple drugs were also designated by the effects each was intended to have. For example, a drug that was digestive (*mundhij*) was one whose "intrinsic

property was to help the process of mixing at the time of digestion by uniform warming; it also has the astringent power which holds together the mixture and forcibly does not let it be dissolved, for that would be a disruption." The properties of other simples could be described as a purgative, a stimulant, fortifying, constipating and so on. A simple drug was called *al-adwiya al-mufrada* as in the title of one the earliest works of this kind composed by Hunayn ibn Ishaq's son, also called Ishaq, who died around 910. A later work of similar nature (*al-Mughni fi'l- adwiya al-mufrada*) was written by the botanist and pharmacologist, **Ibn al-Baytar** (d. 1248) who also produced the encyclopaedic treatise linking simple medicaments explicitly to nourishment and dietetics, *Al-jami' li-mufradat al-adwiya wa'l-aghdhiya* (*Comprehensive Book on Simple Drugs and Foodstuffs*). This was a catalogue of some 1400 medicaments derived from over 250 written sources as well as from his personal observations. As B. Lewin defines a simple drug in his article on **Medicaments**, it was broadly any 'substance which may affect the constitution of the human body.' Medicaments, usually simple but also compound, could be purchased in the market at a **Druggist**'s kiosk.

Compound remedies were found in formularies called **Pharmacopoeias**, or dispensatories, when used in hospitals that contained recipes for their preparation from a multiple of simple substances. **Ibn Sina** (d. 1037), renowned in Europe as Avicenna, had commented on the use of simple and compound medicaments in his famous work, the *Canon on Medicine*. As we have seen, regimen and diet formed the therapeutic starting point for bodily disorders, but if the use of drugs was called for, simple medicaments were preferred in the first instance to compound ones, and these latter were preferred to more invasive techniques to be performed only when necessary. Ibn Sina's cautious advice is interesting:

> Not every disease can be cured by a simple drug, especially not those of a complicated character; if we did find one we should prefer to use it. But we may perhaps find a composition, corresponding with the complicated nature of the disease; or we may find only such a one as needs strengthening in one of its components by an additional element. In that case we have to add a simple drug which enhances its virtue.

He cautioned that "a few drugs are better than a great many for each individual case", adding that the thing which has been tried is to be preferred than the thing which has not been tried, because in each composition both its component parts and their totality are operative. That which has not been tried, can only be considered useful on the strength of our knowledge of its components, but we do not know what will be the effect of their mixture, whether it will yield something better than we expected, or not. For sometimes the result of the mixture is more efficacious than its component parts would seem to promise.

A multi-drug compound might appear simple to prepare yet required many special ingredients and the skills of an expert to produce a mixture as a potential cure. Sabur ibn Sahl's *Small Dispensatory* contains a receipt containing nineteen dry ingredients of plant origin that were pounded, sifted and then kneaded together with honey. It was purportedly useful in the treatment of over three dozen ailments or afflictions and doubtless for that reason was known as 'the great saviour.'

2. *Some renowned later physicians*

A singular feature of current societies in the West is the acclaim given to cooks, who clearly form part of the broader celebrity culture, especially through their projection to large television audiences and from the large sales of their glossy, coffee-table cookbooks. By contrast, how many medical doctors (not actors who play medics in TV hospital dramas) are instantly recognised in public owing to their TV persona or, indeed, known by their learned books? In the Middle East, throughout its medieval centuries, the roles were reversed. Cooks wrote or compiled few books and the names of a couple of them are known but nothing else about them. Physicians, on the other hand, have left posterity not only many texts of their trade (even discounting the numbers of manuscripts that have unfortunately been lost) but also produced more than one of their number who have left accounts of some of their colleagues' lives and works. One well known biographer was **Ibn Abi Usaybi'a** (d. 1270) who left an invaluable collection of nearly 400 biographies of physicians from earlier

periods. Two of these were contemporaries, **Ibn Butlan** (d. 1066) and **Ibn Ridwan** (d. 1061) whose names have been inextricably linked by modern scholarship owing to their 'medico-philosophical controversy' in which each attempted to outstrip the other in a display of erudition. **Ibn Biklarish** (d. ca. 1100) was both physician and pharmacist who lived in the Iberian Peninsula still under Muslim rule; he wrote a work on dietetics sadly known only by its title. **Ibn al-Tilmidh** died at the advanced age of 92 in 1165 and left a famous dispensatory replacing the one that had been in use for nearly three centuries by Sabur b. Sahl (d. 869). Finally, there is the important figure of **Ibn Nafis** (d. 1288) who, apart from medicine, engaged in the study of Islamic religious sciences, leaving a remarkable example of his thinking in his *Theologus Autodidactus of Ibn Nafis*. He followed in his treatment of patients the basic principle underlying humoral pathology namely that "he did not prescribe a remedy as long as he could prescribe a diet, and he did not prescribe a compound remedy as long as he could content himself with a simple drug."

3. *A miscellanea of medicinals*

A popular belief expressed in the adage that any plant had a dual use for both culinary and curative purposes may not be supported by modern studies, yet medicinal substances of plant origin do constitute the overwhelming majority (just over 80%) in most inventories; the remaining percentages are fairly evenly divided between substances from inorganic and animal origin. In the following section, articles selected from the *EI2* give plant and animal substances that were almost exclusive to the *material medica* of the medieval period. Of the items of fauna listed in Part 1:5 above, it should be recalled that some were used chiefly for medicinal purposes, such as the Nile crocodile, the pigeon, the ostrich.

Endive, a close relative to chicory, is not classified as a spice but is regarded as a bitter vegetable in the medieval perspective containing medicinal properties, and rarely appears in the cookbooks. A range of plant **Gum resins** is discussed by A. Dietrich as employed chiefly in medicine. The term by itself (*samgh*) occurs infrequently in the cookbooks and probably refers to the substance gum Arabic. Another gum-resin is **Anzarut**, known from early times and today produced chiefly in Kurdistan and exported to India and elsewhere. Ibn al-Baytar has left the amusing observation that Egyptian women used the substance with yellow melon to increase their physical attraction for men—by becoming fatter. Two medicinal substances from the animal kingdom are the **Scorpion** and the **Mollusc**, although the latter comprise edible mussels, snails and oysters. The **Anemone** (in Arabic *Shakikat al-Nu'man*) was said to have been named after the late 5th century King al-Nu'man ibn al-Mundhir of the Lakhmid dynasty in the neighbourhood of ancient Babylon who was enraptured by the flower's beauty, and after his mother Shakika. The **Myrobalan** is the fruit of the cherry plum which was used as food but more commonly as a remedy well known in India and China since early times and appeared in the Middle East during the first Islamic centuries also as a medicinal. The **Aloe**, apart from its use as a laxative, had numerous applications ranging from an ingredient in toothpaste to a remedy for insanity or epilepsy. **Camphor** was widely used in ancient Japan and China and appeared in Sassanid Persia used as a condiment and perfume. Arabs seem to have known it, at least by name, as it appears in the Qur'an (76:5) describing a potion given to the righteous in paradise; another passage (76:17) mentions a cup of ginger flavoured refreshment. The ash from burned **Bamboo** stems formed crystals (called *tabashir*) used as a multi-purpose medicament including as an aphrodisiac. Finally, **Artemesia** or wormwood is a good example of the problem noted by Dietrich that plant descriptions in the medieval sources (Greek and Arabic) are often inadequate for precise identification owing to the vagueness of plant 'nomenclature and synonymy.'

Climatic conditions varied throughout the Middle East and North Africa so that species of medicinal plants also varied from one region to another. Moreover, many plants described by either Dioscorides or Galen would have been unknown to their Arab counterparts. One solution, providing lists of plant synonyms in different languages proved not to be totally reliable. In this instance,

Dietrich notes the main types of Artemesia given by medieval Arab authors, one being *Shih* in the specific meaning of *Artemesia iudaica*. Lev and Amar, on the other hand, identify *Shih* as Desert Wormwood while Judean Wormwood (*Artemesia judaica*) is called *wakhshizak*, although each is described briefly as a short aromatic desert shrub.

4. *Food, medicine and the Market*

The eponymous founder of the Shafiʿi school of legal practice, Muhammad ibn Idris al-Shafiʿi (d. 820), is reported to have said, "Knowledge is of two kinds: knowledge for religion which is the law (*fiqh*) and knowledge for this world which is medicine." The quotation is found in the introduction to a small work entitled *Experts' examination for all physicians* by Abd al-Aziz al-Sulami (d. 1208) who had first studied Shafiʿi law, but then specialised in medicine and ultimately rose to the post of chief medical officer in Egypt under the Ayyubid dynasty. The notion that two classes of men alone, jurists and physicians, were indispensible to Muslim society may appear self-serving on al-Sulami's part. A quotation immediately following from an unnamed source is more inclusive and persuasive, "an intelligent person should not live in an urban community that does not have five things: a just ruler, a learned judge, an expert physician, a vibrant market and a flowing river." The two so-called 'crucial' professions are now placed in a broader context. Religion informs the believers' conduct in the present world in preparation for the next while medicine informs how the body may be kept healthy throughout the course of a person's life. Next, the convenience and abundance of water, the lifeblood of any town or city, was crucial to its development and prosperity in the opportunities it offered to agriculture and industry. A stable political system under a just ruler guided and instructed by those learned in religious law (*fiqh*) were institutional essentials and finally, what medieval Muslims believed was the second of a city's two focal points, in addition to the Friday congregational mosque, namely, the market.

The authors of the first part of the article on the **Market**, Bianquis and Guichard, draw attention to the religious, social and judicial aspects of urban transformation during the Muslim societies' formative period (650–1200). That is, the travelling merchant was often in this period also a disseminator of religious knowledge so that inhabitants of different cities and regions might "acquire the same access to the commodities of material culture and to the fundamental elements of religious culture." In addition the city markets themselves were supervised by an official, the *muhtasib*, charged with the supervision of the markets according to the religious injunction that Muslims should 'enjoin what is good and forbid what is evil.' The so-called *hisba* manuals were written for these officials as guides in the performance of their duties, their main task being to oversee the markets and prevent dishonest dealing by merchants and artisans. The author of the last part of the article (M. Beg) notes an early work devoted especially to the subject by al-Shayzari (d. 1193), who is said to have composed it for Saladin (Salah al-Din), the famous leader against the Western Christian Crusader movement.

A later, fourteenth-century manual written by one Ibn al-Ukhuwwa (d. 1329), was well known in Egypt and Syria. The work is a catalogue of the trades found in a city's market that included many of those involved selling food stuffs such as flour merchants, millers, bakers and bread makers; butchers and cooked meat sellers; and the makers of preparations like sweets, sellers of livers and appetisers, fish-fryers and milk merchants. Small traders like fryers of cheese and pickle makers are dealt with in a separate chapter. Notably absent from the list are the sellers of fresh fruits and vegetables. The *muhtasib*'s prevailing preoccupation was to be alert, in the interest of public welfare, to food merchants' tricks of product adulteration or collusion in price fixing. The frauds practiced in each trade and tests for the adulteration of goods are described in these chapters.

A second group of chapters deals with trades or professions involved in preparing remedies for bodily ailments and with the broader concerns of regimen and health. Makers of medicinal syrups and other preparations like electuaries, stomachics and laxatives seemed to pose a special challenge to the *muhtasib*. Ibn al-Ukhuwwa states that "The frauds practiced in this category are numerous and

it is not possible to have complete knowledge of them all because drugs and syrups are of various kinds and cures depend upon the character of the ingredients." The inspector's immediate recourse was to threaten divine punishment or warn of immediate penalties for improper practices; periodic inspection of the trader's premises and goods without notice and in the dead of night was advised. The dispensatory of Ibn al-Tilmidh (see above) was recommended as the most valuable source on the use of drugs. Another important concern for the *muhtasib* was the drug seller who must have sound knowledge and experience of his trade; the chapter deals chiefly with the myriad ways drugs could be adulterated. Phlebotomists and cuppers are covered in a separate chapter, the former also being able to perform circumcisions. In certain specified circumstances, the *muhtasib* will insist bleeding cannot be performed without prior consultation with a physician, which implied a hierarchy of knowledge and skills between the healing tradesmen and medical professionals. One final chapter deals with these latter, namely, physicians, oculists, surgeons and bone-setters. Ibn al-Ukhuwwa stresses that the practice of medicine is a basic responsibility of the Muslim community and yet, he remonstrates, there are many towns whose only physician is a Christian or Jew. He adduces the reason for this calamity is that able Muslims devote themselves to branches of the religious law that bring social and material benefits supposedly not available to the physician. "Alas", he concludes, "knowledge of the faith is blotted out." Possibly, the view of al-Shafi'i, seconded by al-Sulami's own life experience did not reflect Muslims' neglect of medicine in their days.

We conclude this introduction with one last observation that reiterates the essay's running theme, namely, the close relationship between the culinary and medical traditions in medieval Muslim societies. This may be illustrated by noting that all of the medicinal preparations mentioned above from Ibn al-Ukhuwwa's *hisba* manual that were prepared and available in the market, were prepared and available also in domestic households of an urban leisure class which had access to the knowledge embodied in the cookbooks described in an earlier section. Al-Warraq's cookbook contains, for example, a chapter on various concentrated fruit juices (*rubb*, pl. *arbab*) recommended for stomach disorders, diarrhoea, and sore throats; a chapter on stomachics (*jawarshinat*) intended mainly as digestives although one recipe was said to invigorate coitus and came with the warning 'not to be given to women'; a chapter on powders (*ushnan*) used for strengthening roots of teeth and keeping the teeth white. Medicinal pills (*habb*, pl. *hubbub*), tablets (*qars*, pl. *aqras*) and drinks (*mayba*) are all mentioned as well as the famous Oxymel (*sakanjabin*) of the Classical world, a potable syrup which in its basic version was made of vinegar and honey or sugar and valued for its cooling properties. In the later anonymous cookbook *Kanz al-Fawa'id*, recipes for each of these and another medicinal preparation, the electuary (*ma'jun*), are found. Unlike compound drugs, these are limited in ingredients and easy to prepare at home. The reason for their inclusion stems from the prevailing, primary therapeutic strategy in medical theory and practice that focused on diet and regimen coupled with humoral pathology. It is unsurprising that similar health concerns were present in the urban domestic household and that these were expressed in the cookbooks. Moreover, Ibn al-Ukhuwwa hinted at another reason. As there was an acknowledged difficulty in guaranteeing the quality of ingredients of medicinal remedies prepared in the market place, described above, the solution was found in these simple preparations of "home remedies" of good quality that could be made and stored for the moment they were required.

Notwithstanding the clear awareness in the culinary tradition of prevailing medical theory and practice, especially the dietetic discipline, it would be misleading to suggest that there was the same interest in or the level of detailed knowledge of treatment and medicinal cures amongst the more informal culinary circles as in those of the physicians. The cook and the medic approached healthy eating in different ways. Ultimately the cook produced dishes for the pleasure of companions at the table; even dishes with curative properties, such as the reduction of fever, had to be prepared with care to attract the patient's attention and stimulate the appetite. Physicians with a concern for food as contributing to a healthy constitution wrote of both the benefit of individual ingredients and dishes when used in the appropriate manner but also of their harm when improperly ingested. The

contrast in approaches may be illustrated by the example of the curative potion *sakanjabin* (Oxymel) already mentioned. One preparation (among others) in the late Egyptian cookbook notes only that it is beneficial for those of a hot constitution (*mazaj*); in other words, the known cooling property of *sakanjabin* would help restore the person to equilibrium. In the physicians' crib of questions and answers by al-Sulami, the chapter "On Treatment" asks how many uses there were for *sakanjabin*. The answer is a lengthy list of 88 benefits. The first states, "it cools a temperament (*mazaj*) inclining toward excessive heat and moderates it by extinguishing and calming that heat" and the final benefit claimed that "it helps keep the uterus from going to one side." In between, *sakanjabin* usefully alleviated a wide variety of fevers and other afflictions such as trembling, and boils, pimples and ulcers on the body. From the cook's perspective a modest knowledge of the medical inventory went a satisfactorily long way.

David Waines,
Lancaster

I Food Sources: Earth, Water, and Air

1. Agriculture and Irrigation

Agriculture (Ar. *filāḥa*)

Falḥ, the act of cleaving and cutting, when applied to the soil has the meaning of "to break up in order to cultivate", or "to plough". *Fallāḥ* "ploughman", *filāḥa* "ploughing". But from pre-Islamic times the word *filāḥa* has assumed a wider meaning to denote the occupation of husbandry, agriculture. In this sense it is synonymous with *zirāʿa*, to which the ancients preferred *filāḥa* (all the earlier writers called their works on agriculture *Kitāb al-Filāḥa*). At the present time this latter word is very widely used in North Africa, both in official language and in everyday speech. Thus, in Morocco, the Ministry of Agriculture is called *wizārat al-filāḥa*, whilst in Egypt, Syria, Lebanon, Jordan and ʿIrāḳ it is called *wizārat al-zirāʿa*. It is only since the last century that the word *zirāʿa* has taken precedence in official and literary circles in the Arab East; but the word *filāḥa* is still very widely used in the language of agricultural workers. The following articles will deal primarily with agricultural methods and techniques.

i.—Middle East

1.—*Technical and historical survey*

Agriculture in the Arab countries is under the influence of two different types of climate: in the south of the Arabian peninsula (Yemen, Ḥaḍramawt and ʿUmān), and also in the Sudan, the Indian monsoon brings abundant rainfall in summer which enables various tropical plants to be cultivated (coffee, datepalms, custard-apples, mangoes, pawpaws, bananas, *catha edulis*, tamarinds etc.). Throughout the rest of the Arab world the mediterranean climate prevails. This climate is characterized by a cold wet winter season, followed by a long summer period which is hot and without rain. The further one goes from the Mediterranean coast the more the rainfall diminishes, until it ceases entirely in certain hot deserts in Arabia and the African Sahara. This basic climatic system divides the zones of Arab countries into

two distinct categories; in the first, tacche extent and distribution of the rainfall favour the economic cultivation of various crops. In the second category the winter rains, though not sufficient to allow of economic cultivation, nevertheless permit the natural growth of certain grasses and various succulent, bulbous and halophytic plants which constitute the pasturages of the desert steppes. In order to make use both of their agricultural land and of the steppes, the Arabs have at all times led two sorts of lives—as a rural or urban sedentary population, and as pastoral nomads.

Nomadism is a necessity in the desert steppes where the winter rainfall varies in extent between 50 and 150 mm., but the Bedouin tribes are not opposed to a sedentary existence. It is in this way that the Yemeni tribes, long before Islam, founded their civilization on irrigation and intensive cultivation of the land. After the Islamic conquests, the Arab tribes soon intermingled with Aramaeans from Syria and ʿIrāḳ, Copts from Egypt and Berbers from north Africa, and with the Ibero-Latins of the Spanish peninsula, in order to exploit together the vast territories of the present Arab countries and of former Muslim Andalusia.

The mediterranean climatic system being everywhere the same, we find throughout these territories three agricultural climates. Firstly, in most of the coastal plains (the coasts of Syria, Lebanon, Palestine, Tunisia, Algeria and Morocco), thanks to a mild winter temperature and an annual rainfall of from 500 to 1,000 mm., it is possible without irrigation to cultivate cereals, annual leguminous plants, various vegetables, tobacco, olives in particular, and even cotton. With the help of irrigation, a vast number of annual or perennial agricultural crops can be successfully grown—citrus fruits, bananas, pomegranates, loquats, early vegetables, aromatic or ornamental plants, etc.

Secondly, in the plains, hills and inland plateaus of Syria, Upper Mesopotamia and North Africa, where the density of rainfall varies between 250 and 500 mm., dry-farming is the dominant system of cultivation for vast areas of non-irrigated land. Of the chief annual plants cultivated in these regions we may mention wheat, barley, sorghum, lentils, chick-peas, vetch, gherkins, melons, watermelons and sesame, while the principal fruiting trees and shrubs are olives, vines, figs, hazelnuts and pistachios.

In these regions, irrigation is indispensable for the cultivation of most fruit trees, ornamental trees, vegetables, leguminous and industrial plants—apples, pears, apricots, peaches, eggplant, tomatoes, gumbo, artichokes, potatoes, lucerne, clover, cotton, hemp, groundnuts, poppies, roses, jasmine, etc.

Thirdly, in regions with a desert climate (Lower Mesopotamia, central Arabia, Egypt, inland regions of Libya and North Africa) where rain is rare and the average annual temperature reaches or exceeds 21° C. it is only by means of irrigation that such plants as date-palms, mangoes, orange trees, cotton, rice, sugar-cane and others can be successfully cultivated.

During the Middle Ages, the Arabs were familiar with and cultivated most of the agricultural plants now known to the Arab world. It was they who introduced Seville oranges and lemons from India to ʿUmān, and thence to Baṣra, Egypt and the coast of Syria and Palestine. From Andalusia and Sicily they disseminated throughout the Mediterranean basin the cultivation of cotton, sugar-cane, apricots, peaches, rice, carobs, water melons, eggplant, etc. Moreover, the European names of many cultivated plants are of Arabic origin, that is to say borrowed directly or

indirectly from words either purely Arabic or long Arabicized.

2.—*Works on agriculture*

The oldest Arabic work on agriculture which we know is *al-Filāḥa al-nabaṭiyya* (Nabataean agriculture) of Ibn Waḥshiyya, written (or translated from the Nabataean!) in 291/904. A little later there appeared a work entitled *al-Filāḥa al-rūmiyya* (Greek or Byzantine agriculture). This book, published in Cairo in 1293/1876, bears the names of Ḳusṭūs al-Rūmī as author and of Sardjīs b. Hilyā al-Rūmī as translator from Greek into Arabic. According to Ḥādjdjī Khalīfa, the author's full name was Ḳusṭūs b. Askūrāskīna, and we think that this is the name of Cassianus Bassus to whom agronomic works collected from Greek and Latin authors are attributed. Ḥādjdjī Khalīfa names three other translators of this book, one of them being said to be Ḳusṭā b. Lūḳā. From another source we know that the agronomic work of Anatolius of Berytos (4th century A.D.) had been translated into Syriac by Sardjīs Rāsaʿnī (d. 536 A.D.), and there is reason to believe that this text was also translated subsequently into Arabic and that no manuscripts of it have survived. In any case, in the two Arabic works that we know (*al-Filāḥa al-nabaṭiyya* and *al-Filāḥa al-rūmiyya*), we find a reasonable knowledge of agricultural practice, side by side with superstitious advice.

In Egypt, the best presentation of agricultural questions at the time of the Ayyūbids is to be found in a work of Ibn Mammātī (d. 606/1209), entitled *Ḳawānīn al-dawāwīn*, published in Cairo in 1943 by the Royal Agricultural Society. In the following century Djamāl Dīn al-Waṭwāṭ (d. 718/1318) wrote in Cairo the (unpublished) book entitled *Mabāhidj al-fikar wa-manāhidj al-ʿibar*, the fourth volume of which is devoted to plants and agriculture. In the 10th/16th century, a Damascene author named Riyaḍ al-Dīn al-Ghazzī al-ʿĀmirī (935/1529) wrote a large book on agriculture which has not survived; but later ʿAbd al-Ghanī al-Nābulusī (d. 1143/1731) gave a summary of it in a work entitled *ʿAlam al-milāḥa fī ʿilm al-filāḥa* published in Damascus in 1299/1882.

In general, the writers of ancient Arabic works on agriculture dealt with the following subjects: types of agricultural land and choice of land; manure and other fertilizers; tools and work of cultivation; wells, springs, and irrigation channels; plants and nurseries; planting, prunung and grafting of fruit trees; cultivation of cereals, legumes, vegetables, flowers, bulbs and tubers, and plants for perfume; noxious plants and animals; preserving of fruit; and sometimes zootechny.

It may be noted that the writers of these works used several non-classical agricultural terms, and made a distinction between plants which fertilize (legumes) and those which exhaust the soil (cereals and others).

The chief principles of dry-farming were not unknown to them, and similarly the principles of variation and rotation of crops. Certain Arab agronomists in Andalusia had at their disposal botanical gardens and trial grounds where they experimented with native and exotic plants, practised methods of grafting and tried to create new varieties of fruit and flowers. We should also note that several ancient Arabic dictionaries, encyclopaedic works and Arabic treatises on agriculture and botany contain the names of numerous varieties of fruit, cereals, flowers and other cultivated plants. Thus al-Badrī (9th/15th century) in his *Nuzhat al-anām fī maḥāsin al-Shām* gives the names, in Syria, of 21 varieties of apricots, 50 varieties of grapes, 6 varieties of roses, etc.

All the early Arabic (or other) works on agriculture, being based on observation

alone, are only of historical and terminological value. It was only in the 19th century that, in Egypt, there appeared the first Arabic agricultural work based on modern science; it was produced by Aḥmad Nadā who, after being sent to France on an educational mission, wrote the two-volume *Ḥusn al-ṣināʿa fīʿilm al-zirāʿa*, published in Cairo in 1291/1874. At the present time, text books in the Arabic language exist in all branches of agriculture, written by the teachers of the faculties and practical schools of agriculture.

3.—*Terminology and literature*

For the Arabic terminology of agronomic science there exists a dictionary compiled by the writer of this article (*Dictionnaire français-arabe des termes agricoles*, Damascus 1943, Cairo 1957), containing about ten thousand terms concisely defined in Arabic.

The Arabic language is rich in agricultural terms, particularly in relation to date-palms, vines, cereals and desert plants (cf. the *Mukḥaṣṣaṣ* of Ibn Sīda), and the imagination of the poets of antiquity has endowed it with a vast and original literature on the nature of plants and their connexions with human beings. Not only flowers (roses, narcissi, jasmine, violets, pinks, irises, anemones, etc.) and fruit (dates, apricots, apples, pears, pomegranates, jububes, Neapolitan medlars, quinces, Seville oranges, lemons, etc.) but also a great quantity of cereals, legumes, vegetables and wild plants of the fields, pasturages and prairies are mentioned or described in verse.

(Mustafa Al-Shihabi)

ii.—Muslim West

So far as we know at present, it was exclusively in the Iberian peninsula, the home of the celebrated Latin agronomist Junius Columella of Gades/Cádiz, that an agricultural literature in the Arabic language was created and developed, particularly during the 5th/11th and 6th/12th centuries, in the brilliant period of the satraps (*mulūk al-ṭawāʾif*) and the Almoravid governors who followed.

The principal centres of this literature were Cordova, Toledo, Seville, Granada and, to a lesser extent, Almeria. In Cordova the great doctor Abu 'l-Ḳāsim Zahrāwī, who died in 404/1010, known as Albucasis in the Middle Ages, is reputed to be the author of a Compendium on agronomy (*Mukḫtaṣar kitāb al-filāḥa*).

In Toledo, at the court of the renowned al-Maʾmūn, the great "garden lover", lived the celebrated doctor Ibn Wāfid (d. 467/1075) known as Abenguefith in the Middle Ages. He was appointed by al-Maʾmūn to create his royal botanical garden (*Ḏjannat al-sulṭān*). Among other works, he wrote a treatise (*maḏjmūʿ*) on agronomy which was translated into Castilian in the Middle Ages. Another inhabitant of Toledo, Muḥammad b. Ibrāhīm Ibn Baṣṣāl, devoted himself exclusively to agronomy. He performed the regular pilgrimage, travelling via Sicily and Egypt, and brought back many botanical and agronomic notes from the East. He also was in the service of al-Maʾmūn, for whom he wrote a lengthy treatise on agronomy (*dīwān al-filāḥa*); this work was subsequently abridged into one volume with sixteen chapters (*bāb*), with the title *Kitāb al-Ḳasd wa 'l-bayān* "Concision and clarity". This work, which was translated into Castilian in the Middle Ages, was published in 1955 with a modern Castilian introduction. The treatise by Ibn Baṣṣāl is singular in that it contains no reference to earlier agronomists; it appears to be based exlusively on the personal experiences of

the author, who is revealed as the most original and objective of all the Hispano-Arabic specialists.

After the capture of Toledo by Alfonso VI of Castile (478/1085), Ibn Baṣṣāl withdrew to Seville, to the court of al-Muʿtamid for whom he created a new royal garden.

In Seville Ibn Baṣṣāl again met ʿAlī Ibn al-Lūnḳuh of Toledo, a doctor and disciple of Ibn Wāfid, and like him interested in botany and agronomy. He had left his native town shortly before its capture and settled in Seville in 487/1094. He died at Cordova in 499/1105.

He also encountered Abū ʿUmar Aḥmad b. Muḥammad b. Ḥadjdjādj al-Ishbīlī, the author of several works on agronomy, among them *al-Muḳniʿ*, written in 466/1073. This writer is distinguished from others by his scorn for "the inadmissible tales of stupid yokels" (*ahl al-ghabāwa min ahl al-barārī wa-aḳwāluhum al-sāḳiṭa*) and his almost exclusive use of ancient agronomists, especially Yūniyūs. However, he also recounts his personal experiences in Sharaf. There he became acquainted with the agronomist Abu 'l-Khayr al-Ishbīlī whose work, with title unknown, is often quoted by Ibn al-ʿAwwām. All that we know about him is that in 494/1100 he was studying with the Seville doctor Abu 'l-Ḥasan Shihāb al-Muʿayṭī.

In Seville, Ibn Baṣṣāl and Ibn al-Lūnḳuh were the masters of the mysterious "anonymous botanist of Seville", the author of the *ʿUmdat al-ṭabīb fī maʿrifat al-nabāt li-kull labīb*, a botanical dictionary of considerable merit and far superior to that by Ibn al-Bayṭār. He seems to have been a certain Ibn ʿAbdūn, to be distinguished from the doctor (Al-Djabalī) and the literary writer (al-Yāburī). The only fact about him in our possession is that he was a member of the diplomatic mission which went to the Almohad court of Marrākush in 542/1147 and that he wrote his *ʿUmda* after that date.

In Granada, the principal agricultural writer was Muḥammad b. Mālik al-Ṭighnarī (from the name of a village now known as Tignar, a few kilometres north of Granada). He worked in succession in the service of the Ṣanhādjī princeling ʿAbd Allāh b. Buluggīn (466/83/1073–90) and then of the Almoravid prince Tamīm, son of Yūsuf b. Tāshfīn, at the time when that prince was governor of the province of Granada (501–12/1107–18). It was for the latter that he wrote a treatise on agronomy in twelve books (*maḳāla*) entitled *Zuhrat al-bustān wa-nuzhat al-adhhān*. Al-Ṭighnarī also went on pilgrimage to the East. Probably while staying in Seville he came into contact with Ibn Baṣṣāl and was able to profit from his experiences. It is probably with al-Ṭighnarī that we should identify the anonymous agronomist whom Ibn al-ʿAwwām frequently quotes under the name Ḥādjdj al-Gharnāṭī. It should be noted that several manuscripts of the *Zuhrat al-bustān* are attributed to a certain Ḥamdūn al-Ishbīlī, who is otherwise unknown.

Towards the end of the 6th/12th century or in the first half of the 7th/13th century (the capture of Seville by the Christians took place in 646/1248), Abū Zakariyyā Yaḥyā b. Muḥammad Ibn alʿAwwām of Seville wrote a lengthy *Kitāb al-Filāḥa* in 35 books (*bāb*). We know nothing of his life. To orientalists, however, he is celebrated since he was the first to be published and also translated, into Spanish by J.A. Banqueri, Madrid 1802, then into French by Clément-Mullet, Paris 1864–7, and finally into Urdū. He is also the only agronomist whom Ibn Khaldūn (second half of the 8th/14th century) thought worthy of quoting in his *Muḳaddima* (he regards the *K. al-Filāḥa* as an abridged version of *al-Filāḥa al-nabaṭiyya*). He is, however, far

from being the most important of the Arabo-Hispanic agronomists. His work is essentially an extensive and useful compilation of quotations from ancient writers and from his Hispanic predecessors, Ibn Baṣṣāl, Ibn Ḥadjdjādj, Abu 'l-Khayr and Ḥādjdjdj al-Gharnāṭī. It is only occasionally at the end of a chapter that he records his own personal observations (introduced by the word *Lī* "this is my own"), made in the neighbourhood of Seville, especially in the district of Sharaf.

Finally, towards the middle of the 8th/14th century, a scholar of Almeria, Abū ʿUthmān Saʿd b. Abū Djaʿfar Aḥmad Ibn Luyūn al-Tudjībī (d. 750/1349) wrote his *Kitāb Ibdāʾ al-malāḥa wa-inhāʾ al-radjāḥa fī uṣūl ṣināʿat al- filāḥa*. The work of an amateur, it is an abridgement in verse (*urdjūza*), based essentially on Ibn Baṣṣāl and al-Ṭighnarī; but it also contains certain valuable information which the author recorded in the words of local practitioners (*mimmā shāfahahu bih ahl al-tadjriba wa 'l-imtiḥān*).

These treatises on *filāḥa* contain far more than their titles would indicate; in fact, they are true encyclopaedias of rural economy, based on a plan closely in line with that followed by Columella in his *De re rustica*. Naturally, the essential feature is of course agronomy (*filāḥat al-araḍīn*): the study of types of soil, water, manure; field cultivation of cereals and legumes; but arboriculture is also dealt with at length (particularly vines, olives and figs), with additional matter on pruning, layering and grafting; and also horticulture and floriculture. Zootechny (*filāḥat al-ḥayawānāt*) also takes a leading place: the rearing of livestock, beasts of burden, fowls and bees; veterinary practice (*bayṭara*). All these fundamental questions are completed by chapters on domestic economy: farm management, the choice of agricultural workers, storage of produce after harvest, etc. Some writers also provide information on measurement of land (*taksīr*) and the seasonal agricultural calendar.

We may imagine that specialists of many sorts were led to contribute to such encyclopaedic works. To start with, there were practitioners and professional workers: farmers (*fallāḥūn*), fruit-growers (*shadjdjārūn*), horticulturists (*djannānūn*); but there were also "scientific workers"—herbalists (*ʿashshābūn*), botanists (*nabātiyyūn*), doctors interested in medicinal plants (*mufradāt*) and dietetics; and there were also pure theoreticians (*ḥukamāʾ, mutakallimūn*).

On the other hand, Hispano-Arab treatises on *filāḥa* were often the work of many-sided writers (*mushārikūn, mutafanninūn*). Beside Ibn Baṣṣāl who was essentially an agronomist, Ibn Wāfid was primarily a doctor. Ibn Ḥadjdjādj was described by Ibn al-ʿAwwām as *imām* and *khaṭīb*. Al-Ṭighnarī and Ibn Luyūn are well-known poets. Finally, the enigmatical Seville botanist Ibn ʿAbdūn could well be the same as his contemporary Ibn ʿAbdūn of Seville, the author of a treatise on *ḥisba*. In this connexion one is reminded of Aristotle, both philosopher and naturalist and creator of a botanical garden, and Virgil, author of the *Georgics*.

The Hispano-Arab agronomists were familiar with and made wide use of ancient writers. A list of them (in which the names are often inaccurate) will be found at the beginning of the translation edition of Ibn al-ʿAwwām by Banqueri. Among the Arab sources, they made use of *Kitāb al-Nabāt* of the polygraph al-Dīnawarī and, in particular, the *Filāḥa nabaṭiyya* of Ibn Waḥshīyya, though for the most part leaving out his farrago of magic recipes. However, in this branch of instruction they have not confined themselves to repeating their precursors' writings. They made their own personal

observations and experiments, in order to adapt their works to the realities of the Spanish soil and climate. They also introduced original chapters on the cultivation of new plants—rice, sugar-cane, date palms, citrus fruits, cotton, flax, madder, apricots, peaches, pears, watermelons, eggplant, pistachios, saffron, etc.

As we have seen, two Arabo-Hispanic treatises on agronomy were translated into Castilian. In this way, Ibn Wāfid's work was widely used by the Spanish agronomist Alonso de Herrera in his famous *Agricultura General* (1513).

Finally we should note that it was in Muslim Spain, during the 5th/11th century, in Toledo and later in Seville, that the first "royal botanical gardens" of Europe made their appearance, both pleasure gardens and also trial grounds for the acclimatization of plants brought back from the Near and Middle East. In the Christian world we have to wait until the middle of the 16th century to see the establishment of gardens of this sort, in the university towns of Italy.

(G.S. COLIN)

iii.—PERSIA

Agriculture in Persia was from earliest times regarded as the fundamental basis of the prosperity of the country. From early times also there has been a dichotomy between the agricultural and the pastoral elements of the population. The Avesta was unequivocal in its approval of the settled life of the peasant and of the practice of agriculture. Agricultural prosperity, which was also in Islamic times traditionally regarded as the basis upon which stable government rested, was closely connected with irrigation, security, and taxation. Rulers were urged by mediaeval Islamic theorists to foster agriculture in order to ensure a full treasury and thus prevent the decay of the kingdom. To this end irrigation works were to be carried out, security established, and extortion against the peasantry prevented. The philosophers and encyclopaedists similarly regarded agriculture as the basic industry, upon which the good order of the world and the perpetuation of the human race depended.

Invasion and dynastic struggles have been the cause of frequent interruption in, not to say decay of, agriculture. For example in Khūzistān, where there had been considerable development under the Sāsānians, the agricultural economy failed to return quickly to its previous level after the Arab invasion in the first half of the seventh century A.D. and there was until modern times a cumulative, though not uninterrupted, decline. The quartering of soldiers on the population in Būyid times appears to have materially contributed to agricultural decline. It has always been the practice of government officials, civil and military, to live upon the country, a custom highly detrimental to agriculture. At no time, perhaps, did the evils of the system reach greater heights than under the Īlkhāns. In the Ḳādjār period the evil was also widespread. In times of war, continuous or intermittent, it was sometimes the practice deliberately to lay waste frontier areas. Thus the Turco-Persian frontier area in Ṣafawid times was reduced to a desert. Many examples at different periods of Persian history could be cited of local officials imposing such severe contributions on the cultivators of the soil as to cause their dispersal and thus lead to the ruin of their land.

Tribal warfare and raiding was another major cause of agricultural decay. Such raiding was common whenever the central government weakened; further, when the tribal population and its flocks rose above the level which could be maintained

by the limited pasture available, either because of a period of drought or because of natural increase, there would be a movement, violent or otherwise, into the settled areas. The balance between the settled and semi-settled elements of the population was extremely precarious, and inevitably adversely affected agriculture on the borders of the tribal regions. Various tribal groups, notably in Fārs, during the course of the late nineteenth and early twentieth centuries became settled and practised agriculture. Riḍā Shāh made an abortive attempt to settle the nomadic population of the country, notably in Fārs, the Bakhtiyārī, and parts of Kurdistān. Since about 1956 there has been a movement by Turkomans and others to reclaim the Gurgān steppe.

Another factor militating against agricultural development has been insecurity of tenure both as regards the peasant and the landowner.

Agriculture is also subject to interruption by the capricious nature of the climate. Drought, due to insufficient spring or winter rain, causing partial or complete crop failures, and floods, with the accompanying destruction of irrigation channels and *ḳanāt*s, are of common occurrence. Earthquakes have also been a contributory factor causing local and temporary dislocation. Ravages by pests, notably the *sunn* pest and locusts, not infrequently cause heavy losses. High winds in many areas and violent hailstorms are other detrimental factors. Deterioration of the soil because of a change in the water table due to over-lavish irrigation or inadequate drainage, or both, is a major problem in some parts of the country, especially Khūzistān and Sīstān; and in some places on the central plateau the soil is salty and the water too saline to be used for irrigation. On the south and south-east borders of the central desert there is a marked tendency for the desert to encroach upon the surrounding area. Soil erosion is widespread, notably in Ādharbāydjān. Its primary causes are climatic and geological, but uncontrolled grazing by goats and the destruction of forests for fuel have steadily increased the tendency towards erosion. Little attention has been given to its control or reduction by modifying existing practices of arable and animal husbandry, or by contour ploughing, which is made difficult by the relatively small size of the holdings. Terracing in mountain valleys, however, is often carried out with considerable skill.

Irrigated and dry farming are both practised, the latter in large areas of Ādharbāydjān and Kurdistān, and to a lesser extent in Khurāsān and Fārs, and on the Caspian littoral for crops other than rice. Everywhere with the exception of the Caspian littoral rainfall is the main limiting factor on agriculture. Gīlān and Māzandarān have a relatively heavy rainfall, well distributed throughout the year with a maximum in early autumn, varying from 50–60 inches in the west to 20 inches in the east and rising to over 100 inches on the northern slopes of the Elburz. The natural vegetation is thick deciduous forest, found up to a height of 7,000–8,000 ft.; where this is cleared fruit, rice, cotton, and other crops thrive. The eastern end of the Persian Gulf littoral comes under the influence of the south-west monsoon. The average rainfall in the coastal district of Persian Balūčistān is 3–4 inches; Bushire has an average rainfall of about 10 inches; and Khūzistān 12–15 inches, with a maximum in December. The plateau, the average elevation of which varies between 3,000–5,000 ft., is ringed by mountain ranges, the general trend of which is from north-west to south-east. The seasons on the plateau are regular but considerable variations of climate are

found. Within the mountains the plateau lies in the rain shadow. In general the 10 inch rainfall line follows the inner foothills of the Zagros-Elburz-Kopet Dagh ring of mountains and marks the boundary between areas where cereals can be cultivated extensively without irrigation and areas dependent upon irrigation. The summer grazing of the nomadic tribes also lies in or near the 10 inch line. Rain begins in November and continues intermittently to the end of March and, in the south and north-east, to the end of April. Heavy snowfalls are common in winter. Vegetation is limited but some forest is found in Kurdistān and Luristān; and a narrow belt of oak forest in Fārs. Considerable areas, notably in Ādharbāydjān, Kurdistān, and northern Fārs consist of mountain pasture. South-east of Tehrān are two great salt deserts, the Dasht-i Kavīr and the Dasht-i Lūṭ, which together with Sīstān have a relatively low elevation. The climate of Sīstān is one of extremes and the average annual rainfall only 2 ½ inches. It is estimated that only 10–14 per cent of the total area of the whole country is under cultivation. Some 30 to 35 per cent is desert and waste. The remainder is grazing-land and forest.

Grain crops

Wheat and barley are the staple crops and are grown as irrigated (*ābī*) and unirrigated (*daymī*) crops up to an elevation of about 10,000 ft. Maize and millet have also been widely grown throughout the country since early times. Wheat is mainly grown as a winter crop; but in the high valleys of the Zagros and Elburz it is also grown as a spring crop. The regions with the greatest production of wheat are the neighbourhood of Mashhad in Khurāsān, western Ādharbāydjān, Hamadān, Kirmānshāh, and Iṣfahān. In south Persia wheat and barley are sown between the first week in November and the first week in January, and in central Persia between the end of October and the end of November; and spring wheat between the end of February and the end of April. Wheat is harvested in the south about the end of April or the beginning of May; in the upland areas of Fārs about a month later, and on the plateau some two to two and a half months later. Barley is harvested about three to four weeks earlier than wheat. The yield on wheat varies greatly in different parts of the country. In general it is low. The peasant normally saves part of his crop for the following year's seed.

Rice

The main rice-growing area is in the Caspian provinces. Some rice is also grown in the Lindjān and Alindjān districts of Iṣfahān and, on a small scale, in Fārs, Khūzistān, Kurdistān and other districts. According to tradition rice was originally imported from India. In some areas rice is sown broadcast, but in the main rice-growing areas such as Māzandarān and Iṣfahān it is sown in nurseries (*khazāna*) and transplantation (*nishā'*) takes place after a month. In Māzandarān the land is ploughed in April, flooded and then ploughed twice more. A fortnight after transplanting weeding (*vidjīn*) begins, the weeds being trampled into the mud. The rice fields are kept permanently under water for two to three months. Rice is reaped in September. The main varieties are known as *ṣadrī*, *girda*, *dum-i siyāh* and *ʿambarbū*.

Sugar cane

This was mainly grown in Khūzistān in early Islamic times and in the middle ages; and to a minor extent in Māzandarān. In the later middle ages its cultivation in Khūzistān died out. An attempt was made in Ḳādjār times to revive it, and

also to cultivate sugar cane in Gīlān and Iṣfahān. In recent years the cultivation of sugar cane in Khūzistān has begun on a more extensive scale as a result of new irrigation developments. Planting takes place in March or April and the cane is cut in November.

Minor crops

Pulses and oil seeds are widely cultivated; and some fodder crops, such as lucerne and clover. A great variety of vegetables is grown especially near urban centres. Potatoes were introduced into Persia by Sir John Malcolm during the reign of Fatḥ ʿAlī Shāh. Dye-plants, mainly in the central Zagros region and Kirmān, and other plants used in industry such as saffron, hemp, flax and, in the Dizful and Shustar areas, indigo (which was introduced by the Būyid, ʿAḍud al-Dawla), madder, and, round Yazd and Kirmān, henna, and, in Māzandarān, jute, have been cultivated since early times. Vegetable gums, including gum tragacanth and asafoetida, are cropped mainly for export. The latter was known in early Islamic times. Oak-gall is produced mainly in Kurdistān. A variety of flowers and a kind of willow were cultivated for scent; the former also contributed to bee-keeping.

Fruit

Persia has been famous for fruit-growing since early times. Many varieties of vine are cultivated and found up to an altitude of 4,500 ft. Vine cultivation is mainly by irrigation, except in some areas of Kurdistān. On the plateau the vines are covered with earth in the winter. Apricots, peaches, nectarines, figs, melons, pomegranates, plums, cherries, pears, and apples are widely grown. Citrus fruits are important in the Caspian provinces and south Persia, especially in Khūzistān and southern Fārs. Recently citrus cultivation has been extended to Bam. Dates are widely cultivated in south Persia and on the coastal plains bordering the Persian Gulf. The female plant is impregnated by the male in March or April, some two males going to a plantation of fifty. Nut trees, especially almonds and pistachios, are of importance. Olives were cultivated in early Islamic times in Nīshāpūr, Gurgān, Daylam, and Fārs. The main area of cultivation at the present day is Rūdbār in Māzandarān, where cultivation increased after the decline of silk production in the middle of the nineteenth century. The grafting of vines and other fruit trees has long been practised. At the present day in Kirmān and Fārs almonds and pistachios are grafted on to the wild almond tree (*bāna*).

Although large landownership has been the dominant form of land tenure, large-scale farming was not (and is not) practised, except exceptionally. The agricultural unit was the ploughland (*djuft*, *khīsh*, *zawdj*) and agriculture was carried on mainly as subsistence agriculture; this is still predominantly the case. Broadly the ploughland consists of an area which a pair of oxen can cultivate annually; but it varies in size according to the nature of the soil, the type of agriculture practised (dry or irrigated), practices with regard to fallow, the kind of crops grown, the draught animals used, and the pressure or otherwise on the land. The average ploughland ranges from some 60 to 20 acres; but in some areas holdings are much smaller, as for example in Mārbīn, one of the districts of Iṣfahān, where cultivation is mainly carried on by spade. The relation between the peasant and the landowner was formerly usually regulated, and to some extent still is, by a cropsharing agreement. The ploughland or peasant-holding is usually run as a fam-

ily concern by the peasant and his sons or other members of the family; extra labour may be required at harvest time and at certain other seasons of the year. In some areas three or four ploughlands are run together as a unit (*buna*). Periodical redistribution of the ploughlands among the peasants of a village used to take place, usually by lot, in some districts.

The main draught animal used on the plateau is the ox. Donkeys and, especially in Khūzistān, mules, and in the Persian Gulf littoral, Miyāndoāb (in Ādharbāydjān), and Mahābād (in Kurdistān), buffaloes, and in Persian Balūčistān, the camel, are also used. In some areas, notably Sīstān, oxen are hired for ploughing to the cultivators by graziers. Where the soil is stiff more than one pair of draught animals may be required. Donkeys and camels are the main pack-animals. Small bullock carts are found in western Ādharbāydjān and some of the Armenian villages in Firaydan.

The plough (*khīsh*) used is of the hook type having a large or small steel share. The plough beam is linked to the yoke by means of a rope sling. There is no mould board and the soil is ripped open leaving an open, coarse, cloddy tilth. There are slight differences between the plough used in (i) Fārs, Kirmān, and Sīstān, (ii) Iṣfahān, Hamadān, Tehrān, and Ādharbāydjān, and (iii) Gīlān and Māzandarān. Seed is sown broadcast.

In addition to the plough, a kind of harrow (*māla*) is used; it differs slightly in shape in south and central Persia on the one hand and north-west Persia on the other. Two kinds of levelling board are in use, a relatively large board drawn by a draught animal, and a smaller board (known in central Persia as *katar*), which is used for the preparation of irrigation check banks, and operated by two men, one pulling and the other pushing. Three types of spade are used, one in Fārs, which has a wooden cross bar, the second in central Persia, which has a turned footrest, and the third in Ādharbāydjān, which has a rolled edge.

Grain is cut with a sickle (*dās*) which has a plain cutting edge; scythes are used in northern Ādharbāydjān, where they were introduced from Russia at the end of the nineteenth century. A small toothed sickle is used for cutting grass and lucerne, etc. Corn is tied into sheaves and left to dry or carried straight to the threshing floor (*kharmangāh*). Pod crops, such as peas, beans, linseed, and carraway seed, are mainly threshed by beating with rods; and in those parts of the country where draught animals are scarce, corn is also threshed in this way. A threshing board, the bottom surface of which is studded with sharp pieces of flint stone held in position by wooden wedges, is used to thresh grain. It is attached by a rope to a yoke and drawn, while a man stands on it, in a circle by an ox or oxen or other animal over the threshing floor. A threshing wheel or wain (*čūn,ʔčān*) is used, especially in north-eastern, central and south Persia. This is a sledge-like carriage, usually drawn by two oxen with two sets of rollers, which turn round as the sledge beams slide over the sheaves. The rollers carry sharp-edged steel discs, sometimes with fine saw teeth, or have steel knives or prongs with sharp edges, one roller having the edges parallel to the axis, and the other having them at right angles. In some parts of Ādharbāydjān the wain has wooden spokes. The third method of threshing is for the grain to be trodden out by strings of oxen, donkeys, or horses driven round the threshing floor. Winnowing is done by wooden forks, the grain being thrown six or seven feet into the air. The grain drops straight down while the chaff is carried by the wind and settles on a separate heap.

A second winnowing done by wooden shovels is sometimes necessary. Finally the grain is sifted to separate it from the stones and earth with which it may have become mixed during threshing and winnowing. Two men can winnow and sift 20–25 cwt. of corn a day. Donkeys and other pack animals take the grain in sacks to the granaries. The chaff is removed in nets and used as fodder for horses, donkeys and oxen.

Sheep and goats are commonly grazed on stubble fields, which thus receive a slight benefit from their manure. For the most part, however, animal dung is used as fuel. In some dry farming areas there is insufficient rainfall to rot the manure even if it were used. Household sewage mixed with earth is used as fertilizer in some areas, especially round urban centres. Earth from old walls and ruined buildings is also broken down and spread on the fields. Gardens tend to be manured more regularly than fields and to be cultivated annually. Pigeon lime, collected in pigeon towers, is used in the Iṣfahān district for the cultivation of melons and pear trees. Fakhr al-Dīn Rāzī mentions the use of bird lime and weed-killers. Fish manure is used in Kirmān for pistachio trees. Chemical fertilizers have been introduced in recent years but their use is comparatively rare.

Practices in fallow, during which the land may or may not be ploughed, and crop rotation vary very widely. Unirrigated land tends to be left fallow for long periods. Irrigation is usually by inundation. In vineyards, melon land, and market gardens the water is let into the land by irrigation trenches. In land watered by *ḳanāts* the tendency is to cultivate more intensively the land nearest the mouth of the *ḳanāt* to avoid water loss while that at the end of the *ḳanāt* is less frequently cultivated.

In many parts of Persia the crops have to be guarded, especially at night, to prevent depredations by wild pig and other animals. Scarecrows (*matarsak*) are erected in some districts.

(A.K.S. LAMBTON)

iv.—OTTOMAN EMPIRE

During the period between the 8th/14th and 11th/17th centuries, when the *tīmār* system prevailed in the Ottoman Empire, the *raḳabe, i.e.*, the freehold ownership of agricultural lands was regarded as vested in the State. The tenure of lands held as *waḳf* and *mülk* in the pre-Ottoman Muslim states of Anatolia was in part confirmed, but Meḥemmed II converted some of them to *mīrī*—land, as he did the land belonging to Christian monasteries in the territories of Trebizond: generally speaking the central authority, when it was powerful, attempted to increase the extent of *mīrī*—land.

According to the typical *ʿörfī ḳānūns* promulgated in these centuries, land was granted on lease to farmers in parcels usually termed *čift* or *čiftlik*. The peasant could not transfer these *raʿiyyetlik* lands as *mülk* or as *waḳf* or as a gift. If he wished to sell them or give them up he was obliged to obtain the permission of the *sipāhī* and pay a fixed charge, the *ḥaḳḳ-i ḳarār* (in the 11th/17th century, 3% of the selling price). Thus the peasant possessed merely the right of usufruct (*istighlāl*); and this right could pass directly only to his sons. The *čift* unit of land could not be divided: if more than one son inherited they enjoyed the usufruct jointly. In principle, the peasant could not leave this land: if he did, he was obliged to pay the *čift bozan resmi* (50 *aḳče* in the 9th/15th, 75 *aḳče* in the 10th/16th century; as the number of peasants leaving the land increased so the *čift bozan resmi* was increased, with the fall

in the value of the *aḳče*, to 300 *aḳče*s). If the peasant left the land unworked for more than three years, the timariot could grant it to another. The use to which the land was put could not be changed: agricultural land, for example, could not be converted to pasture, vegetable-growing or fruit-growing. Agricultural land turned over to vine- or vegetable-growing without the *sipāhī*'s permission could, if less than ten years had passed, be restored to its former use. The State expected the peasant to sow a definite quantity of seed on land of a given area. Vineyards and vegetable-gardens near towns or around houses were exempt from these regulations, being subject to the *sh*ar*ʿ*ī rules of ownership. The status of the land and the farmer was confirmed by the *taḥrīr* carried out at fixed intervals.

The problem in the Ottoman Empire was not shortage of land but shortage of labour; and it is probably for this reason that the peasant was bound to the soil. On the *tīmārs* there were several areas of untenanted land, known as *mezraʿa* and *ekinlik*. The State was concerned above all to prevent the peasants abandoning the land and moving away: the *sipāhī* who provoked this was severely punished, while those who could persuade farmers to settle on vacant land were rewarded. The *taḥrīr* registers of the time of Süleymān I, however, show that new land, referred to as *ifrāzāt*, had then been brought under cultivation, for at this period the population had increased considerably and the State encouraged the cultivation of *mawāt* lands, heretofore left unused; such lands were exempt from *tapu resmi* until the next *taḥrīr* was carried out.

A further degree in State control of the land and of agriculture is found in the active participation by the State, exemplified particularly in rice-growing. Under this system, applied with the object of ensuring supplies for the army, rice-growing was carried out under the supervision of *emīn*s, responsible for the administrative and financial organization, and of *čeltik reʾīsleri*, responsible for the actual cultivation. Every *čeltikd*j*i* was obliged to sow a definite amount of seed on a definite area, both prescribed by the State. The irrigation-canals were kept in repair under the supervision of the *reʾīs*. From the harvested rice, after seed had been set aside, the State took one-half (in some areas two-thirds). As compensation for this, the *čeltikd*j*iler* so organized were exempt from certain taxes. The cultivation of rice was introduced into Rūmeli by the Ottomans, and extensive rice-fields under State control appeared in the valleys of the Merič (Maritsa), Karasu, Vardar and Salambria. A similar system of State participation prevailed in the villages which, in order to ensure the food-supply of Istanbul, were created in the vicinity of the city by the settlement of prisoners of war.

Thus the principal characteristic of the classical Ottoman land-system was direct State control of the peasant and the soil, a system which had grown up to meet the military and financial needs of an absolutist administration, and in which the state's main concern was to ensure the revenues of the *tīmār*s. This *tīmār* organization and the Ottoman land-system broke up in the period of anarchy which began at the end of the 10th/16th century. Lack of settled conditions and heavy taxes caused the peasantry to abandon the soil in droves: in the first half of the 11th/17th century this movement from the land reached disastrous proportions and was called 'the great flight', '*büyük ḳačḳun*'. In many districts local dignitaries and Janissaries turned the abandoned agricultural land into pastures for their flocks of sheep. The new *ḳānūns* concerning the use of land and the *raʿāyā* which were promulgated in the

early 11th/17th century are the result of efforts to solve this problem.

In the 11th/17th and 12th/18th centuries the most important change in agricultural conditions was brought about by the spread of the systems of muḳāṭaʿa and *iltizām*. There arose a new class of *aghas*, *aʿyān* and derebeys in Rūmeli and Anatolia who, holding possession of the land for life, became in practice great landowners. Although Maḥmūd II succeeded, after 1227/1812, in putting down the great *aʿyāns* and derebeys, the village *aghas* and the lesser *aʿyān* maintained themselves as the ruling class in the social sphere. In many areas the peasant had now sunk to the position of tenant or share-cropper on the lands held as *muḳāṭaʿa* by the *aghas*: in this state of affairs is to be found the basic reason for the peasant risings in the Balkans in the 19th century.

Difficulties of communication meant that agricultural products were in general disposed of in local markets. Cereals were distributed further afield only in areas near the coasts or in the vicinity of cities or along the great military routes. In the 8th/14th and 9th/15th centuries Venice bought large quantities of cereals from Western Anatolia, Thrace and Thessaly. In the same period cotton and dried fruits were exported from Western Anatolia to countries in the north. From the 9th/16th century onwards increased trade with Western Europe led to an increase in the export of the cotton and cotton goods of Western Anatolia. In the 19th century, the agricultural methods of the peasantry were dictated entirely by tradition. In this field ethnographical observations can be supplemented from the *ḳānūns* for sandjaḳs and notes in the registers concerning agriculture and irrigation. The *mufaṣṣal defterler* contain much material on the crops grown in various areas and their productivity; the various agricultural implements are to be found listed in the *ḳāḍīs*' registers of effects (*metrūkāt*). The Anatolian peasant divided his land into three or two sections, and followed the principle of leaving each fallow for two years or one year. Important details on the irrigation methods employed in the Ilkhānid period in Anatolia are found in the letters of Rashīd Dīn. In the Ottoman period, in arid districts like Central Anatolia and Diyārbakr there was a special régime for irrigation.

The Ottomans were naturally acquainted with Muslim works on *ʿilm al-filāḥa*. The *K. al-Filāḥa* of Shaykh Abū Zakariyyāʾ Yaḥyā b. al-ʿAwwām was translated into Turkish in 998/1599 by Muṣṭafa b. Luṭf Allāh. Two works by Ottoman authors were well-known: *Rawnaḳ-i būstān* by Ḥādjdjdj Ibrāhīm b. Meḥemmed, and *Gharsnāme* by Kemānī, composed in 1047/1637. Both these works are concerned with the growing of fruit trees, and contain chapters on the soil, planting, pruning, grafting, the diseases of trees and their treatment. The author of the *Rawnaḳ-i būstān* discussed in a final section the gathering and keeping of fruit; he had himself, he says, made an orchard near Edirne and added to the data of books on *filāḥa* what he had learned from experience.

(H. İNALCIK)

v.—INDIA

This section offers a survey of agriculture in India during the mediaeval period, *i.e.*, from the time of the arrival of the Muslims to the British conquest.

1.—*Agriculture*

The natural setting of agriculture in India, despite various important variations, displays a surprising degree of uniformity. The larger part of the country

consists of plains: the great Indus and Gangetic Plains of the north and the broad river valleys of the south. Except for the extreme tip of the southern peninsula, where there is a significant winter monsoon as well, the rainfall received is mainly from the summer monsoons. These are so bountiful that nearly half of the area of the Union of India has an average annual rainfall of over 100 cm. Some mediaeval writers could, therefore, be excused for their exaggeration when they said, as Abu 'l-Faḍl, that the whole of the land of India was cultivable or, as Bābur, that its crops needed no artificial irrigation. Nature has also made possible another phenomenon, regarded in mediaeval times as the special characteristic of Indian agriculture, *viz.*, the sowing and reaping of two harvests in the year—one (*kharīf*) collected after the end of the rains, and the other (*rabīʿ*) at the end of the winter.

A comparison of 11th/17th century area statistics with modern returns suggests that the cultivated area during the 11th/17th century was about half of the area cultivated at the beginning of this century in such large regions as Bihār, eastern and central Uttar Pradesh, Berār and Western Pākistān. In western Uttar Pradesh, eastern Pandjāb and Gudjarāt, the area cultivated was smaller by one-third to one-fifth. The great extent of forest in mediaeval times is also indicated by the information we possess about particular localities. We know, for example, from the chroniclers' accounts of campaigns in Kaṫehr (now Rohilkhand) that extensive forests existed in this region in the 13th and 14th centuries. While these were largely cleared during the following three or four centuries, the Tarāʾī forest still covered, further to the east, most of north-eastern Uttar Pradesh (now a densely populated area), down to the end of the 18th century.

All descriptions of mediaeval agricultural practice apply equally well to the traditional practice in Indian villages today. There existed the same combination of simple and crude tools with certain ingenious methods and devices. While the fitting of the "iron point" to the wooden plough is referred to in a work as old as the *Manusmriti*, Fryer (1672–81) found that in fact the "coulters" of Indian ploughs were "unarmed mostly, Iron being scarce", and that hard wood was being used instead. Yet on the other hand, Amān Allāh Ḥusaynī (early 17th century) notices the use of dibbling in sowing cotton, and Thévenot in Gudjarāt observed the use of fish manure in planting sugar-cane.

Rainfall was generally supplemented by artificial irrigation, from wells, tanks and canals. Bābur has described for us the two most common methods of lifting water out of wells. One involves lifting water in a leathern bucket (*čaras*) pulled out of the well by yoked oxen drawing a rope passed over a wooden wheel, "a laborious and filthy method". The other (the *rahaṫ* or *arhaṫ*), which deeply interested Bābur, is called in English the Persian wheel. The *ḍhenklī*, based on the use of weights, has been described by Fryer. Large tanks for irrigation purposes were usually constructed by damming streams and rivulets. Fīrūz Shāh (752–90/1351–88) is said to have built several tanks by means of such dams (*bands*). The Udaypūr lake, created by a massive dam in the 16th century, was originally about 40 miles in circumference. Abandoned channels of rivers, which became active during the inundations, served as natural canals and were important sources of irrigation in the Indus basin. Human effort was often needed to keep them in use by clearing silted sections. In addition there were some big man-made canals. The best known of these was Fīrūz Shāh's West Jamunā

Canal, re-excavated and re-aligned by Shāhdjahān. Among other important mediaeval works were the East Jamunā Canal (early 18th century), a long canal drawn from the Sutledj by Fīrūz Shāh, a network of Mughal canals drawn from the Rāvī near its entry into the plains, the Sidhnai (which the Rāvī took as its main bed in or before the 16th century), the Begārīwah in upper Sind (17th or 18th century) and the Khānwah in the Indus delta (early 16th century).

Most of the major crops raised today were also raised in mediaeval times. A few new crops were introduced during the mediaeval period itself. Tobacco cultivation became well established throughout the country during the earlier part of the 17th century. Coffee cultivation had its beginnings late in the same century, while the cultivation of capsicum spread rapidly in the earlier part of the next. Among the purely modern crops may be counted maize, potatoes, tea and groundnuts.

The geographical distribution of the crops in the 17th century (and so presumably earlier) was different in some important respects from that prevailing today. There was the same broad division into rice and wheat zones marked by the 40- or 50-inch isohyets. But the cultivation of cash crops, notably cotton and sugar-cane, was far more widespread in mediaeval times, the conditions of transport prohibiting concentration. Indigo claimed a large area, in mediaeval times as well as till late in the 19th century; but its cultivation has now practically disappeared. Similarly, opium and hemp were more widely cultivated than now. On the other hand, jute, though known to have been cultivated in certain localities in Bengal, was far from being an important cash crop during mediaeval times. Sericulture, which has undergone a great decline since, flourished mainly in Bengāl and Kashmīr.

Among fruits the most prominent were the mango and the coco-nut. The pine-apple was introduced during the 16th century through the agency of the Portuguese, and was rapidly acclimatized. The practice of grafting seems to have been widely applied in Mughal times. Djahāngīr describes its application to cherries and apricots in Kashmīr. Amān Allāh notices its use in planting mangoes, and a history of Shāhdjahān's reign declares that great improvement in citrus fruits resulted from grafting. The Emperors and their nobles were generally fond of laying out orchards. Fīrūz Shāh is said to have planted 1200 orchards around Delhi. The Mughals have given their name to a particular type of garden, laid out in squares and criss-crossed by channels of flowing water obtained by various devices.

Abu'l-Faḍl in his famous work on Akbar's administration, the *Ā'īn-i Akbarī* gives much information relating to agriculture. In its detailed accounts of the provinces of Akbar's Empire, the book contains lists of prices of agricultural products, tables of revenue-rates on the various crops, and area statistics and sundry information on cultivation and irrigation.

(Irfan Habib)

Date palm

Nakhl (A.) is a substantive of a collective nature (unit. *nakhla*, pl. *nakhīl*) denoting the date palm (*Phoenix dactylifera*) of the order *Palmae*, sub-order *Coryphineae*. In Persian it is *nakhl* or *khurma*, in Turkish *hurma aghadjı*, in Hebrew *tāmār* and in Tamaḥaḳ, according to the sex, *azzay/tazzayt, émellé/tamellalt, tadamant*.

This attractive tree with dioecious flowers is probably one of the first to be known and exploited by mankind in the hot and arid zones of Africa and the Ori-

ent. The important role which has always been played by the date palms and their fruits in the diet of sedentary and nomadic populations of these zones is attested, in Arabic, by the rich terminology devoted to them. Regarding the tree itself, each element of its structure is defined by one or several terms which, for the most part, have been retained in the local dialects.

After germination of the stone of the date (*nawā*ⁿ; Tamaḥaḳ, *akebbu*, pl. *ikebba*), there emerges from the sand a turion (*fasīla, sālī, wadiyya*; Tamaḥaḳ, *alkem*) which can be transplanted. The young cultivated plants (*aṯhā'*) are arranged in rows to form and orchard (*ṣawr, ḥā'iṯh*). When the stem of each (*ǧiḏhᶜ*) has its crown of young palms within reach of human hand, it is known as a *ḳā'id* (Tam., *teghelelt, tesakent*) and, above the height of a man, it is called *raḳla*, then *ᶜaydāna*. When, after five to six years, it has attained its final height, which can be between 15 and 20 m., it becomes the *bāsiḳa* or *ᶜawāna* if it is a single isolated tree. The date palm planted beside water is called *kāriᶜa* or *mukraᶜa*. If it leans excessively and is in danger of being uprooted, it needs propping up and, when supported, it becomes *ruḏjabiyya*. In old age, the date palm loses its garland of palms and bears no more fruit; it becomes desiccated and is then *saḥūḳ* or *ṣunbūr*, suitable for felling. The overall mass of foliage (*khūṣ*) in a cluster consists of some fifty broad leaves serrated in pinnate fashion; the leaf or palm (green, *ṯhaṭba*, dry *saᶜaf*; Tam., *takarart*) has a firm central stem known as *ḏjarīd* which, when stripped of the leaf, is used for various purposes. It is this *ḏjarīd*, used in the manner of a javelin, which gave its name to the well known equestrian sport which has been so popular in Abyssinia, the Near East and Turkey, from the period of the Mamlūks to the present day, rivalling the game of polo and the "bouzkachi" of the Afghans and Mongols. The inflorescence, in spike or spadix form (*ṭalᶜa, ḍabba*) is enveloped in a bract (*ḳināba, ḳunnāba*), the spathe (*kāfūr, kufurrā, kaṯhar*) which opens with the blossoming of the flowers (*ḍaḥḳ, ghārīd, ighrīd*; Tam., *aghatū, eherer*). Those of the male date palm (*fuḥḥāl* and pl. *ḏhukkāra*) produce pollen (*lāḳāḥ*) which, in natural conditions, is transported by the wind and honey-gathering insects and deposited in the calyx of the female flowers to fertilise them. Natural fertilisation (*talḳīḥ, ḏjibāb*) is often imperfect, being too dependent on chance, and at a very early stage humans developed a procedure for artificial pollination (*taḏhkār, ta'bīr*) of female date palms, climbing the tree and shaking a bundle of male flowers over the female flowers to ensure good fertilisation. This practice was followed by the Babylonians, according to Herodotus, and was later mentioned by Aristotle's pupil, Theophrastus, and by Pliny; it is still in use in commercial palmeries. The fertilised female date palm is called *ma'būr* and at its first pollination it is described as *muhaḏjdjana*. Certain date palms can be precocious in producing (*bakūr, bakīr, mutahaḏjdjina*) while others bear fruit only in alternate years (*sanhā'*). It can also happen, according to the atmospheric conditions of the season, that the dates of a productive tree fall when they are still green; the tree is then described as *khaḍīra*.

The date palm is often cited in the Ḳur'ān (19 mentions) as an example of the beneficence of Divine Providence towards humanity; it is often associated here with the vine, the olive, the pomegranate and with cereals. Worth recalling is this touching legend evoking the miracle of the birth of Jesus Christ (sūra XIX, 24–26): the Virgin Mary retires alone beneath a palm-tree to give birth to her child and the latter having arrived, she laments, driven to despair by her desolation and loneliness; but the God-child, placed at the foot of the tree, is immediately able to

speak and advises his mother to shake the tree; succulent dates fall from it in profusion, while a spring of fresh and limpid water emerges from the sand. Refreshed and nourished, the Virgin takes heart and, strengthened by divine support, she rejoins her kinsfolk with her child.

Besides dates, the date palm provides other useful products. In dietary terms, the pith of the young trunk or palmite (*kaṯhar, ḏjaḏhab, siḏhāb, ḏjummār*), white and of starchy consistency, resembles cheese and is a delicacy still much appreciated by gourmets. Similarly, when boiled, the outer bounds or "palm-cabbage" taste rather like artichoke. The sap rising in the trunk may be extracted, providing the drink known as "palm-wine" (*lāgmī*); it is obtained either by pollarding the tree and surrounding the cut section with a receptacle which fills rapidly, or by slashing the stem vertically, and collecting the secretions in a manner similar to the procedure used for the extraction of rubber. This very sweet and refreshing liquid has the disadvantage of fermenting quite quickly, becoming charged with alcohol which renders it intoxicating; as such, Muslims must abstain from consuming it. In the field of craftsmanship, the dried folioles of the palms are collected by the basket-maker (*ḵhawwāṣ*) who weaves them into mats (*ṭalīl*, pl. *ṭilla, ṭulul, aṭilla*) and small baskets for dates (*dawḵhala*, pl. *dawāḵhil*). The ligneous fibres (*ḵhulb, latīf*) of the trunk are very durable and provide the material for stout cables and ropes much used by fishing fleets and coastal trading vessel; after carding, this fibre provides excellent packing material (*disār*) for the caulking of ships and the stuffing (*ḥaṧhw*) of mattresses and cushions, especially those of pack-saddles and stools. Finally, for the carpenter (*naḏjḏjār*), the large trunks, well dried and squared, constitute the base material for building work in the form of girders, rafters and pillars.

For the desert populations, the palmeries (*ḥadāʾiḳ al-naḵhl*) have always been centres of sedentarisation and civilisation. In Biblical times the date palm was quite abundant in Palestine, and Phoenicia or "land of palms" owes to it its name, from the Greek φοινιξ. Theophrastus and Pliny agree in attesting the abundance of date palms in Judaea, and this is confirmed by other historians, Strabo, Pausanias, Tacitus and Aulius Gallus. These testimonies explain the representation of the date palm on the Roman and Hebrew coinage struck in this country, as a symbol of prosperity. It is thus that the city of Jericho was known as the "city of palms", and Strabo described its rich palmery with admiration. Similar evidence is to be found in accounts of pilgrimage to the Holy Land, in various periods, until the 17th century. The enclosed valley of the Jordan and the region of the Dead Sea also enjoyed this source of nourishment, as did the outskirts of Jerusalem, Samaria and Galilee. According to the remnants of Egyptian and Assyrian monumental decorations, it may be asserted that the date palm was to be found in abundance from the Nile to the Euphrates. Solomon had built the city of Tadmur (Palmyra) "city of palms" between Damascus and the Euphrates; it was destroyed by the Emperor Aurelian in 273 A.D. For their part, Muslim geographers and travellers of the Middle Ages have not neglected to mention in their accounts the great palmeries and oases from the Maghrib to ʿIrāḳ and Persia. It is necessary only to follow Ibn Baṭṭūṭa who, in the 8th/14th century, travelled throughout the Muslim world, from Morocco to the Indies, to have, by means of his valuable *Riḥla*, a virtually exhaustive list of the great palmeries of the period, most of which still exist today. In particular, he notes the comparable excellence of the dates of Baṣra and those of Siḏjilmasa and Iwalaten, in southern Morocco. At

the present, the renown of the succulent *daglāt al-nūr* "fingers of light" of Algeria and Tunisia, exported to all parts of Europe, needs hardly to be stressed.

The coverage and shade provided by the palmery create conditions favourable to animal as well as vegetal life. Thus the date palm has its share of arboreal guests who use it both as a habitant and a source of food. Among these, the most common is the Palm Rat or Alexandria Rat (*Mus alexandrinus*) which, as a result of maritime trade, has spread as far as Italy. It builds its nest at the top of the tree and, when hunted, it blows itself up like a balloon and, consequently, can drop to the ground without suffering any harm. It is often confused with the Cabbage-Palm Rat (*ṭunba*; Tam., *akkolen*) which in fact is a small squirrel (*Euxerus erythropos*) living on dates; its flesh, when pounded, is administered in pellet form to camels as a remedy against fits. In the Indies, the Cabbage-Palm Squirrel (*Sciurus palmarum*; *sindjāb al-nakhl*, *djulhum*) and the Reddish Rat (*Mus rufescens*) are found in a date palm habitat. In addition to these small mammals, a considerable population of fruit-eating passerines and wild doves is to be found nesting in the clumps of palms.

(F. Viré)

Sugar cane

The Arabic *ḳaṣab al-sukkar* is also called *ḳaṣab al-maṣṣ*, because one sucks it, and *ḳaṣab ḥulw*. Cultivated sugar cane may be from a wild variety, but the attempts which have been made to cultivate the wild species which is related to it have not been successful. The country of origin of sugar cane cultivation is Bengal, from where, in the 7th century B.C., it must have passed to China. Herodotus did not know of it, nor did Ctesias, physician of Artaxerxes Memnon (*ca.* 416), but in the age of Alexander the Great, Nearchos, his admiral, and Onesicritos, who composed a history of this ruler's expedition, speak of a reed of India producing "honey without bees", as does Megasthenes, who was the ambassador of Seleucus Nicator. Theophrastos, author of a history of plants who died in 287 B.C., speaks of a *meli kalaminon*, an expression that is translated as "reed honey". Pliny did not know of sugar cane, but Dioscorides mentions a kind of coagulated honey from India and Yemen that is gathered from a reed.

It is not known exactly when the cultivation of sugar cane passed from India to Persia. The scholars of the celebrated School of Medicine of Djundaysābūr, which flourished between 532 and 579 A.D., knew of sugar cane through their relations with India. It is not impossible that they had a part in the introduction of sugar cane into Persia, where it found favourable ground for its cultivation in the hot and humid swampy land of Lower Mesopotamia and Khūzistān. After the conquest of Persia by the Arabs, the cultivation of sugar cane was developed by them fairly rapidly, wherever the conditions of the climate responded to the needs of the plant, and it reached as far as the Muslim West.

I.—Muslim East

The zones of cultivation of sugar cane in the Eastern Muslim world are quite numerous, for several regions have low ground enjoying a hot and humid climate favourable to its cultivation and able to be irrigated easily. The cultivation of sugar cane has also developed

– in Khūzistān or Ahwāz, in the region of Tustar, watered by the Masruḳān canal diverted from the Dudjayl, in that of

Djundaysābūr, that of Sūs (Susa) on the banks of the Karkha, a tributary of the Dudjayl;
- in the region of Baṣra, in the 4th/10th century, according to Bayhaḳī, who wrote in the age of al-Muḳtadir;
- in Ṭabaristān to the south of the Caspian, in the region of Mīla;
- in Fārs, Makrān, Kirmān;
- in Khurāsān, in the region of Balkh;
- in Sind; in ʿUmān;
- in Syria-Palestine, at Kābūl, Tyre (plantations in the hands of the Venetians at the time of the Crusades), and Beirut;
- in the Ghawr of the Jordan valley; and at Tiberias;
- in Egypt, the cultivation of sugar cane has been attested there by some papyri in the 2nd century A.D.; yet, if this cultivation was not exactly introduced there by the Arabs, it was in fact they who developed it, along the length of the Nile, from Upper Egypt to its mouth, the best ground being the low-lying land watered by the branches of Rosetta and Damietta. Al-Masʿūdī notes the great richness of Egypt in sugar and al-Ḳalḳashandī says that production far exceeded that of the Ghawr.
- In Sindjar, the word *ḳaṣab* in al-Muḳaddasī really seems to designate the sugar cane there. According to al-Zuhrī, a geographer of the 6th–7th/12th–13th century, edited by Hadj-Sadok, it was also cultivated in Abyssinia.

Sugar cane was cultivated in several of these regions, not only for the manufacture of sugar, as was practised in Khūzistān and Egypt, but also to be chewed or sucked, hence the term *ḳaṣab al-maṣṣ*. It is this that al-Muḳaddasī notes at Tiberias where, he says, the people spent two months of the year "playing the flute", *i.e.* sucking the cane (*yazmirūna: yamuṣṣūn al-ḳaṣab*).

It is curious that the Arab geographers do not mention at all the cultivation of sugar cane in a region where it is grown at present, sc. Cilicia; in Tarsus for example, in September, sugar cane is sold in the streets.

Beyond the regions indicated as belonging properly to the Muslim East, the cultivation of sugar cane was introduced by the Arabs, or in imitation of them, not only into the West (North Africa, Morocco, Spain, see below), but also into the following countries:

- into Cyprus, where the cultivation of the cane was highly developed in the environs of Limassol, in the south of the island, and at Bafa (Paphos) in the West. In the period of the Crusades, the family of Cornaro, the King and the Knights of St. John had plantations in the region of Colossi;
- into Rhodes, Crete (Candia) and even Greece in the Morea;
- into Sicily. The Arab geographers and al-Idrīsī do not speak of the cultivation of sugar cane in this land (the *ḳasab fārisī* that Ibn Ḥawḳal mentions there may not be sugar cane, although Lippmann thinks that it does designate sugar cane). Nevertheless, it is certain that, towards the middle of the 4th/10th century, sugar was already being manufactured in Sicily and this sugar was being consumed in Ifrīḳiya, for the *Riyāḍ al-nufūs* of al-Mālikī, dedicated to the scholars of Ḳayrawān, mentions that a *faḳīh* called Abu'l-Faḍl al-ʿAbbās b. ʿĪsā, who died between 331/943 and 335/947 in the war against Abū Yazīd, refused to eat a cake that he believed to have been made with sugar from Sicily, as a result of rights conceded by the (Fāṭimid) usurper. It is certain that Roger II and his successors encouraged the cultivation of sugar cane in Sicily, and the diploma cited by Amari, show that this cultivation was flourishing in the 6th/12th century and that sugar

was being manufactured at Palermo. This cultivation continued until the end of the 9th/15th century.

We are informed about the cultivation of sugar cane and its complicated technique (repeated ploughing and harrowing, division of the field into small squares—*aḥwāḍ*—which the water reaches by channels, planting, irrigation, measures to bring on growth, struggle against weevils by means of tar, the two successive harvests, the first called *al-raʾs*, the second *al-k̲hilfa*, which usually gives better sugar than the first, etc.), by the Arab treatises on agriculture, and the works relative to financial administration, especially on Egypt. We are unable to give the details here and to explain the technical terms. We will only say that the planting was done in February–March (month of phamenōth) and that the harvest took place in November–December (month of koyak), that three kinds of cane were distinguished, the black, the white and the yellow of which only the two last were pressed.

(M. Canard)

II.—Muslim West

Sugar cane, reached the West (Magh̲rib, Spain, Sicily, the Balearic Islands, Provence, etc.) in the wake of the Arab expansion in the Mediterranean. Greek and Roman antiquity seems, in fact, to have recognized it as a botanical curiosity only (Dioscorides, Pliny, Strabo, etc.). The exact dates of its first appearances in the various Mediterranean lands are not known precisely. It can, however, be presumed that they followed closely on the advance of the Arabs, who had discovered its cultivation in the East (Mesopotamia) and encouraged it for economic and fiscal reasons. The first allusion to it in the Magh̲rib is found in the "Book of Plants" (*Kitāb al-Nabāt*) by the eastern botanist Abū Ḥanīfa al-Dīnawarī (d. 282/895). From the 4th/10th century, its presence is noted by as many of the principal Muslim historians, geographers or voyagers as of European ones. As a result, we have precise evidence in Ibn Ḥawḳal for the 4th/10th century, al-Bakrī for the 5th/11th century, al-Idrīsī and the *Kitāb al-Istibṣār* for the 6th/12th century, al-ʿUmarī for the 8th/14th century, and Leo Africanus and Marmol for the first and second half of the 16th century.

In Spain, where it is described in the reign of ʿAbd al-Rahman I, during the Muslim period the growing of sugar cane extended from Valencia and Castellón de la Plana to the mouth of the Guadalquivir. Its cultivation suffering from the expulsion of the Moriscos; it was henceforth limited to the area between Malaga and Alméria, which it still occupies at the present time, the principal areas being found around Motril, Almuñecar, Nerja, etc.

In Algeria, Tunisia and Libya, it was noted at Algiers, Awd̲jila, Surt, Ḳasṭīliya and Tozeur.

In Morocco, it spread from north to south, from Tangiers and Ceuta (Balyūnas̲h) to Goulemine and to Ḳṣābī along the Atlantic coast, with Uld̲ja of Salé, Ḥawz of Marrakus̲h and Sūs as the main localities. For this country, textual evidence can be cross-checked with tradition and especially with recent research and discoveries in archaeology. Fifteen sugar-refinery foundations, of which six have been excavated, have been identified in the Ḥawz of Marrakus̲h under the Tensift (Sidi S̲hiker), the Ḳsob water course (Suwayra ḳadīma) and S̲hiS̲hawa (where two foundations were found), as in Sūs.

The variety cultivated must have been hardy, and because of the region's geographical situation in a semi-arid marginal zone, the cane could only have prospered with the aid of a massive irriga-

tion system and very elaborate cultivation techniques. Indeed, some vast irrigation networks comprising numerous remarkable works of art have been uncovered in Morocco at the same time as the sugar refineries. In all regions, canals for carrying water, aqueducts and recovery basins have been uncovered, indicating a use of water both skilful and economical, for it was also used to drive the mills. Today sugar cane cultivation has completely disappeared from Morocco, Algeria and Tunisia. In Morocco, however, a "sugar-refinery plan" envisages the revival of its cultivation alongside that of sugar beet in regions where water has been dammed up, not necessarily in those where sugar cane was formerly grown. There are various reasons for the disappearance of this plant but, for the whole of the Mediterranean, the primary cause was the disruption of the sugar market following the discovery of new territories and subsequent increasingly valuable investment in the West Indies and America. Burdened by the onerous need for irrigation, only in Spain cane production could withstand the competition of the New World lands; yet it should not be forgotten that sugar cane contributed to the economic prosperity of the Muslim lands of the West for almost eight centuries.

(P. BERTHIER)

Olive tree

(Ar. *zaytūn*; *Olea europaea* L., the cultivated olive; *O. oleaster*, the wild one).

1. IN MATERIA MEDICA AND FOLKLORE

Olives and their oil (*zayt*) have been used as a food and medicine since ancient times. In the Ḳurʾān, Sūrat al-Tīn, XCV, 1, we have an introductory oath "By the fig and the olive…".

According to Dioscorides, leaves of wild and cultivated olive are beneficial for the eyes, skin conditions, pains and inflammations (i, 137–140). Zahrāwī describes the extraction and use of oils (*adhān*) not-ably various types of olive oil. Green unripe olives give *infāḳ* (*omphakion*: cf Dioscorides, i, 29); according to him, oil washed in water is *rikābī*, a "vehicle" for other ingredients (but see 2. below for another, more widespread explanation of the term). Olive oil is mentioned as useful in ointments (*marāhim*) which need astringent properties; his *maḳāla* 24 on ointments lists 86 prescriptions, of which 47 contain oil. He quotes Dioscorides that oil warms and softens the skin and protects from the cold (Albucasis 81, 90, 98–100, 114–15, cf. Dioscorides, i, 30) Ibn Sīnā recommends it for many internal and external ailments (*Ḳānūn*, i, 309–10). Al-Kindī uses oil for burns (nos. 120, 135) and abscesses (nos. 129, 131), whilst Galen recommends it for headache (310–12).

Olive oil has long featured in folk medicine, continuing up to the present time. It has the authority of the Prophet, for it is "from a blessed tree", and is recommended in particular for erysipelas, itch, ulcers, and skin eruptions (*Medicine of the Prophet*, tr. John-stone, 227). In Persia of the 1930s, it was "much used in magical rites". Gabriel was said to have told Adam to plant an olive tree and from the fruit to extract an oil which could be used for any pain; thus it was said to cure "every illness except that one from which a person is destined to die" (Donaldson, *The wild rue*, 141, 144). Earlier, in Palestine, it is mentioned as being used for wounds (Canaan, *Aberglaube*, 69). In this region in the 1970s, it was recommended, in villages or by the local herbalist (*ʿaṭṭār*), for earache, sprains, as a massage on the throat for the ton-

sils, and on the joints for cases of acute influenza; with ghee (*samna*) and sesame oil (*shīraḏj*) it was used for ulcers on the leg. It could also be used with soap and egg white as a "plaster" for fractures, and was drunk in small quantities for kidney stone.

Modern Western use is mainly culinary, but also as eardrops and in compound oils.

2. Olive cultivation

The domesticated olive tree was an important food plant in the Mediterranean region and Asia Minor during the Islamic era. The primary centre of cultivation was Syria and Palestine, but substantial groves were also found in Spain. In Egypt there was limited production of olives in the Delta, especially near Alexandria, according to al-Muḳaddasī and al-Ḳalḳashandī. Olives were cultivated in the Fayyūm and the Sīwa oasis since the Hellenistic period. Ethnographic descriptions of olive planting and the folklore surrounding olives focus on Syria and Palestine (see Crowfoot and Baldensperger, and Dalman), especially in reference to biblical studies (see Moldenke).

Information is available in the major mediaeval agricultural treatises about the cultivation of olives and their use in the form of olive oil (*zayt*), although much of this is copied from earlier classical texts. The most extensive source on olive cultivation comes from the widely-quoted *al-Filāḥa al-Nabaṭiyya* attributed to Ibn Waḥshiyya and reflecting much older practices in the region of ʿIrāḳ and Syria. According to this source, the best time for planting olive trees is when the sun is at the midpoint of the zodiacal house of Pisces until it reaches the middle of Taurus, during February and March; this general time frame is frequently reported in the mediaeval almanacs. In most cases, the young shoots should be irrigated, especially right after the planting, and manure is recommended. Classical sources quoted by Arab authors indicate that human dung is not suitable for fertilising olive trees. Much of the technical advice is mixed with magical claims for pomoting growth, protecting from pests and treating diseases, changing the taste or colour of the olives, and preparation of olive oil. For example, planting is said to be more propitious if the moon is waxing and is in the one of the two houses of Saturn.

A variety of methods are recorded for planting olive trees from shoots around the base of an existing tree. These are sometimes grafted with stock from wild varieties. The sources note that trees planted from seed, which usually occurs in late autumn, do poorly under domestication. The sources suggest planting in fine and pliable soil in locations protected from hot winds. Olives do not grow well in saline soils. Cultivation is preferable in the mountains because of the cool air.

Olive production occurs after the tree reaches maturity, generally in about 15 years. It is difficult to kill an olive tree by cutting it down, since new shoots will be sent up from the roots. In Palestine, excessive dew and heavy moisture can damage the pollen when the olive tree is flowering. The best olives come from trees which are 40–60 years old. Olives were traditionally harvested in November in Palestine and Syria, either by men climbing the trees and throwing the olives down or by beating the trees with sticks. Al-Aṡmaʿī quotes ʿAbd al-Mālik b. Ṣāliḥ b. ʿAlī that olives trees can survive up to 3,000 years (!).

One of the best varieties of olives was the Syrian *rikābī*, so-called because it was exported from Syria on camelback. Thaʿālibī noted that this variety was especially regarded for the purity and clarity of its oil. *Rikābī* olives and their oil were

exported widely in the Islamic world, including Yemen and Mecca, where olives were not grown.

(D.M. Varisco)
(Penelope C. Johnstone)

Wheat

Ḳamḥ is the name for wheat in Syria and in Egypt; in ʿIrāḳ wheat is called *ḥinṭa* and in Arabia it was called *dhurr*. These different words are also used in the literary Arabic of the western and eastern provinces of the Muslim empire.

Wheat was the main grain crop in the Near East from the beginning of the Muslim period (and much earlier), while in Europe in the Middle Ages even the upper classes ate bread made from barley and rye. The predominance of wheat among cereals distinguished Muslim countries from the Far East also, as Chinese travellers observed.

Muslim physicians recommended abstention from other bread and literary evidence shows that in the caliphal period only the poor classes of southern ʿIrāḳ ate rice bread. In Khūzistān and in some Caspian provinces, such as Māzandarān, however, there were extensive rice plantations or rice was even predominant. But in the central provinces of the Muslim world people ate bread made of cereals other than wheat only in times of distress, e.g., famines, or when the general prosperity had declined considerably, as in Egypt at the end of the 9th/15th century. Bread made of barley was the food of ascetics.

The accounts of the ʿIrāḳī treasury of the 3rd/9th century, which have come down to us in extracts included in the works of the geographers Ḳudāma b. Djaʿfar and Ibn Khurradādhbih, contain information on the quantities of wheat and barley received as taxes in kind. These figures point to a slight predominance of barley, but this cereal was used for animal fodder. Furthermore, the accounts show that barley was grown mainly in districts where the soil was apparently less adapted to wheat growing. It is worth noting that the equilibrium between wheat and barley was a striking feature of agriculture in ʿIrāḳ from Sumerian times and is still characteristic at the present day. In the days of the caliphs Upper Mesopotamia produced great quantities of wheat which were shipped to southern ʿIrāḳ. In Syria the provinces of Ḥamā, Ḥimṣ and Baʿlabakk, and particularly the Ḥawrān, were veritable granaries, supplying the surrounding regions with wheat. In Palestine wheat of excellent quality was grown in the coastal plain, so that al-Muḳaddasī could praise the quality of the bread of Ramla. Egypt, which had earlier supplied Rome and Constantinople with wheat, exported it in the days of the caliphs and their successors to the Ḥidjāz and to other countries. The main wheat-growing region was the Ṣaʿīd, the southern part of the country. Arabic authors emphasise that some types of Egyptian wheat were unequalled. Barley-growing had been decreasing in Egypt before the Muslim conquest and probably continued to decline thereafter. European travellers who visited Egypt in the 8th/14th century dwell on the excellent quality of its wheat bread. So over many centuries the predominance of wheat remained unchanged. Throughout the coastal regions of North Africa wheat was produced and was the staple food, at least of the town-dwellers. Speaking of the province of Būna, the geographer Ibn Ḥawḳal says that wheat and barley were so plentiful that their quantities could not be measured. The Muslim merchants of North Africa exported wheat to the countries then called Ghāna and Takrūr, now part of Senegal and Mali.

The predominance of wheat was universal in Muslim lands. Only in very dry regions, such as Kirmān and Nubia, was *dhura* (sorghum) grown. Of course the wheat grown was not of the same variety elsewhere. The geographer al-Bakrī says that in the province of Sidjilmāsa, in western Morocco, there was grown a small-grain "Chinese" wheat. All the texts quoted so far refer to the golden age of Muslim civilization. In the later Middle Ages the cultivation of wheat declined in many regions of the Muslim world, as regards both the extent of the areas cultivated and the quality of the grain, this being a result of bedouinization.

The papyri, the Arabic chronicles and the writings of various Arabic authors contain extensive data on the prices of wheat and of barley. In the Near East in the ʿAbbāsid period their price ratio was 2:1 and in the later Middle Ages 3:2. It is evident that grain prices rose under the Umayyad and the ʿAbbāsid caliphs, both in ʿIrāḳ and in Egypt, by 900 per cent or even more. Prices in Egypt were however much lower than in ʿIrāḳ. From the end of the 4th/10th century the price of wheat began to fall in ʿIrāḳ and from the end of the 5th/11th century in Egypt, a fact probably connected with the main trends of demographic development: the growth of population (i.e., of consumers) in the caliphal period and the decrease from the period of the Crusades.

The measures in which the grain prices are given are in the classic period the *kurr* (2925 kg.) in ʿIrāḳ, the *ghirāra* (208.8 kg.) in central Syria, the *makkūk* of Aleppo (about 82 kg.), the *tillīs* (67.5 kg.) and later the *irdabb* (69.6 kg.) in Egypt and various *mudd* in the provinces of North Africa.

(E. Ashtor)

Millet

Arabic *djāwars* (< Persian *gāwars*) is millet, *Panicum miliaceum* L. (Gramineas), one of the oldest cultivated plants. While in Europe it is now almost only used as fodder, millet plays a prominent role as cereal and victuals in many areas of Asia and Africa. Although the ancient Spartans ate millet, Dioscorides considers millet as the least nutritious of all cereals. This is adopted by the Arab translator, who renders the Greek κένγχρος with *kankharūs* (and variants). But already Ibn Māssa, a contemporary of Ḥunayn, says that millet, cooked in milk, or broth mixed with millet flour and fat, is an excellent food. On the nomenclature, the following can be remarked: occasionally, *kankharūs* is understood as both *djāwars* and *dhura*, and the first of these is equated with the Mozarabic *banīshuh*. Others consider *djāwars* as a kind of *dukhn* (also *alūmus* < ἔλυμος), by which may be meant the small sorghum (Pennisetum spicatum), widespread in the Sudan and also called Moorish millet, while *dhura*, also called *djāwars hindī* "Indian millet", indicates the great sorghum (*Sorghum vulgare*). In his book on plants, Abu Ḥanīfa equates *dukhn* with *djāwars* and considers it as a kind of *dhura*. In the course of time, *dhura* has become the leading expression for millet. Bīrūnī knows already the Turkish term *dārī* for this, and names the Indian synonyms.

As a foodstuff, *djāwars* has the inconvenience of causing constipation, of being hard to digest and of promoting urine, but the constipation effect can be removed by adding fat or purgatives, and also by diluted wine or by baths. On the other hand, when applied in a warm compress, it proves to be a good remedy against gripes and cramps. It has an astringent effect and is therefore suitable

to be used as nourishment for those suffering from dropsy, whose stomachs should be contracted and whose bodies should be "desiccated".

(A. Dietrich)

Barley

Shaīr (Ar.) is barley (*Hordeum* L., Gramineae family, the Arabic term being applied to several different species), one of the major cereals cultivated throughout the Middle East from earliest times. Mediaeval medical texts classify it among the numerous "grains" (*ḥubūb*, which, naturally, included wheat but also pulses like lentils and beans) which, in bread preparation, formed an essential part of the diet of all but the most well-off of the population. The semantic association between bread (of whatever substance), sustenance, and life itself is found in several Semitic vocabularies. Even if more widely consumed than the scarcer (and hence more expensive) and less hardy wheat cereal, barley was judged less nourishing than wheat. The term occurs in the Traditions, suggesting its use both in the baking of inexpensive bread as well as in other popular dishes like *khaṭīfa*, *talbīna*, *tharīd* and *sawīḳ*.

By nature it was said to be moderately cold and dry (in contrast to wheat, which was hot and moist), which made it suitable for persons of hot complexion in summer, or with a fever. Hence medical opinion held that barley bread was also convenient for young persons but not for the elderly. The medical texts describe the benefits of certain barley preparations: flour, or barley water applied to the skin was said to remove blemishes as well as providing protection against leprosy. A preparation of barley and milk (called *kishk*) was an antidote to fever, and washing the body with it opened the pores, a treatment also for exhaustion and for travellers. Barley water had the properties of a diuretic and emenagogue. Barley *sawīḳ* was good for fever.

These and other preparations are also found in the mediaeval cookbooks as purely food for pleasure. One barley water recipe is designated especially for Ramaḍān. Barley flour was also the chief ingredient in the famous condiment *murrī*. A recipe for the beverage *fuḳḳāʿ* (apparently intended to be alcoholic) employs barley flour, while in another similar preparation it is advised against as being harmful; it was also used in the popular drink *aḳsimāʾ* and in the condiment of pickled garlic. Finally, a recommended means of preventing bunches of grapes from rotting is to bury them in barley.

(D. Waines)

Rice

Al-ruzz (vars. *aruzz, uruzz*) is the Arabic word for rice, *Oryza sativa* L., one of two major cultivated species, the other being the indigenous African variety *O. glaberrima*, both of which spring from perennial rice. Arabic agronomical manuals do not distinguish among the known varieties of wild rice, although several types may well have been employed in addition to the domesticated kind.

From its place(s) of origin in India or China *ca.* 3,000 BC., the use of rice spread to the Middle East, where it was also cultivated in pre-Islamic times, albeit in limited areas such as Mesopotamia and Jordan. Knowledge of rice spread slowly among the classical cultures of the Mediterranean; its diffusion westward as a cultivated crop is evident in Islamic

times and references to its cultivation in al-Andalus from the 4th/10th century are numerous.

The 6th/12th century Andalusī author Ibn al-ʿAwwām, who cites, among others, his eastern predecessor Ibn Waḥshiyya, relates various methods of planting rice. These included the familiar (and recommended) submerging of the seedlings in water to drown their weed competitors; however, they were also planted in drier or drained areas which required careful weeding. Transplanting seedlings to the paddy field after they had swollen was the preferred technique, but non-transplanting was apparently also practiced. Milling techniques were basic; the plants were dried after harvesting and then placed in sacks and beaten with metal rods to remove the kernels. After winnowing, the kernels were placed in another bag and beaten to remove the husk. After a second winnowing, the milled, unpolished, white grains were stored in earthenware jars. There is no mention of subsequent polishing of the grains or of using the ancient Indian technique of parboiling the plant to preserve more of its nutrients, such as vitamin B1. Two crops a year were harvested, the summer crop being said to be better than the winter one.

Out of all the cereals known in the mediaeval Islamic world, rice did not seem to enjoy the wide-spread popularity that wheat, sorghum and barley did. Nevertheless, in areas where it was heavily cultivated, such as the southern parts of the Sawād of ʿIrāḳ and Khūzistān, rice bread was the staple of the poor and al-Djāḥiẓ reports that it was the favoured fare of misers, who offered it to their guests. The rice bread baker was called *khubz aruzzī* (the *nisba* of the popular poet of Baṣra Abu 'l-Ḳāsim Naṣr al-Khubzaʾ aruzzī. The physician al-Rāzī (d. 320/932) observed that rice bread was less digestible than wheat bread, hence it should be eaten with salty food or with a lot of fat or with milk or garlic in order to prevent ill side effects. In this connection, Canard has remarked upon references to the consumption of rice and rice bread with fish in ʿIrāḳ. Ibn Zuhr (d. 557/1162) adds that rice bread produces thick humour, causes obstructions in the intestines and has an astringent effect upon the stomach.

The general medical view of rice itself was that it inclined towards the "cold" element by nature which, it was said, could be modified when cooked with milk or fat and eaten with sugar. When cooked with milk, oxymel was recommended to be drunk afterwards to counter obstructions in the stomach caused by it.

Food preparation with rice was not, however, confined only to bread among the lowest classes. The mediaeval Arabic culinary manuals, which reflect the urban ambience of a leisured class, contain recipes where rice is employed in a number of ways. The following is a representative selection taken from an anonymous work of probable Egyptian provenance of the 7/13 or 8/14 century. These include rice as an alternative to cornstarch as a thickening agent in stews made with meat and vegetables, where the rice is added in the last stage of preparation. In another receipt, washed rice cooked in fresh milk and seasoned with mastic, camphor and cinnamon appears to be close to the modern popular rice pudding dish, *muḥallabiya*. The mediaeval version of *muḥallabiyya*, by contrast, was made with meat or chicken, sweetened with honey and seasoned with spices to which saffron-coloured rice is added. Indeed, the most common way of using rice in a substantial dish was to cook meat and/or vegetables with it in the same pot. One variation called *al-labaniyya* containing meat and leeks or onion is cooked in milk (*laban*) together with a little

powdered rice. A dish called *al-aruzziyya* contains meat and seasonings (pepper, dried coriander and dill), into which a small amount of powdered rice is added during cooking and washed (whole) rice towards the end of the preparation. A further use for rice is found in the well-known Egyptian spiced beverage *sūbiyya*, which could be made with either wheat or rice. And, as with certain other beverages, this could have been made in both an intoxicating and a legal, non-alcoholic, version. The method of preparing rice flour is given in one receipt for use in another preparation called *ushnān*, a perfumed (powdered, pasty?) mixture for washing and scenting the clothes and hands. Finally, rice was also used in making vinegar.

The remaining extant mediaeval Arabic cookbooks contain dishes similar in style to these just mentioned. One, *aruzz mufalfal*, which appears in several versions, was evidently very popular and ressembles a type of Turkish *pilaw*. Made with spiced meat and/or chick peas or pistachio nuts, the dish may contain rice coloured with saffron, white rice alone or a combination of both. A variation of this dish, called *al-mudjaddara*, made from lentils and plain rice, is similar to the modern preparation of the same name. Modern uses of rice which may not go back earlier than the 8th/14th century include rice presented alone as accompaniment to other dishes and as a filling for vegetables such as courgettes and the leaves of the cabbage and vine.

(D. Waines)

The Vine (Ar. *karm*)

To one who knows the official attitude of Islam towards wine, the vitality of the cultivation of the vine in the majority of mediaeval Muslim countries may appear paradoxical. Nevertheless, it is incontestable, and is explained by the force of tradition in some countries where the vine has long been established, by the multiple uses of the grape (fresh fruit, dried raisin, vinegar, pharmaceutical uses, the lees as fertilizer, etc.), by the survival of non-Muslim communities, and also by the laxity of many Muslims themselves. This vitality is attested in particular, perhaps due to the written tradition, by the very considerable and exceptional place that the Muslim agronomists accord to the vine in comparison with the other species studied, from the easterner Ibn Waḥshiyya or the *Calendar of Cordova* to the Andalusians of the 5th/11th and the 6th/12th centuries, to whom we owe the essential part of that which will be summarized below. Their knowledge resulted from the combination of the data of the ancient authors, rediscovered and assimilated (with, in Spain, Junius = Columella added to the sources known in the Orient) with the intensive day-to-day experience constantly renewed.

To summarize this knowledge is difficult, since one of the principal characteristics of the cultivation methods described is precisely the meticulousness of their application and the multiplicity of the methods followed. Nevertheless, it appears generally that the vines cultivated, more numerous than in our days and transported by the Arabs from one end of their conquered lands to the other, did not remain stabilized and were the object of experiments of selection and acclimatization that we know particularly with regard to Spain (between the plain and the mountain, for example), but that were also tested in the East, where Ibn al-Faḳīh and the Persian agronomists of the Mongol period in particular preserve

for us the names of various kinds of vines. The vegetative cycle of each vine-plant being different, the agronomists, applying the principle of the complementary nature of a defect and a quality (such as adaptation to dryness or humidity, etc.) mainly made use of the diversities of the climates and soils of the Mediterranean zone and the Near East.

Some systems of cultivation predominate in the Andalusian treatises: (a) The low vine, planted in holes or trenches (recommended, but little practised) about 1.40 m. apart, supported or in low clumps, thinned out very little in order to protect the grape against the sun: a method of cultivation reserved for warm sites; (b) The climbing vine, classical in the Mediterranean region, where the creeper was used as support for the fruit trees with shallow roots, whose height had to be controlled so that they did not injure the vine; in contradiction to the ancients, the Andalusians rejected the intercalary cultivation that exhausts the vine, and especially the association of the vine and the fig-tree. The best soils were alluvial, humid, but not saturated, according to the westerners, and also sandy according to Ibn Waḥsiyya, but one might also make use of the rich soils for the species that derive nourishment easily; the principle of complementarity took the place of the modern idea of forced cultivation. The choice of sites was adapted to the vines' wants; slopes and hillsides for the low vines, valleys and plains for the climbing ones, mountains in order to test the quality of a vineplant; it was banned from the marshlands, sources of the vine's diseases. The preparatory work was a deep tillage with the spade, with trenches larger than the furrows of tillage in the earth of mediocre quality and holes for the good localities with a depth of at least 2 cubits (almost a metre) for protection against the sun. The surface work of the end of the first year was a loosening with the pruning knife to spare the roots, those nearest to the surface meanwhile being cut back to strengthen the deepest.

Reproduction in the nurseries was done in the form of taking cuttings, layering (*takbīs*) and sowing in a manner conforming to the practices of our days. The stratification was systematic. As for the shoots, cuttings and layered branches, it is often pointed out that they should not be planted together in the same hole, which proves that it was done. Most authors agree in recommending planting in spring, although the early species might be planted in autumn (hesitations that one would still encounter today); the Egyptian fiscal treatises speak of planting in February or March. The vinestocks, once tested for three years in very poor soil, they were transplanted in the vineyard chosen to receive them.

Well spread out fertilization was especially necessary in the planting and pruning, above all when vines were made to follow another vegetable insufficiently treated with animal manure, usual in the Middle Ages; it was reduced to a powder, and, according to an Aristotelian principle, the ashes of the stems of the plant itself were preferred; this preference for dry fertilizer is a particularly modern aspect of Andalusian viticulture. Irrigation depended on the climate, the soil and the plant chosen; watering by hand was frequently carried out in order to proportion better the quantity of water needed to obtain really syrupy and not-too-full grapes.

Among the measures taken to increase the vine's productivity, pruning (*zabr*) was the principle practised in winter with the iron pruning knife (*mindjal*) already described by Columella; the aim was to draw the sap towards the best developed wood.

Grafting, already known to the ancients, was the subject of descriptions and experiments infinitely more varied among the Muslim agronomists. Everything was taken into consideration, form and colour of the grape, the syrupiness of the juice, the early or late quality of the vine-plant, the degree of alcohol, etc. In order to improve the species for the achievement of precise needs, fantastic means were sometimes adopted (*e.g.*, grafting the vine on the olive-tree). On the technical level it was grafting by terebration (*taṭāʿama* according to Ibn Ḥaǧǧāǧ cited by Ibn al-ʿAwwām).

Like today, the protection of the vine against diseases and bad weather distressed the vine-grower, who was impotent before the scourge. More than the Romans, the Andalusians feared the proximity of the sea and, with good reason, drizzle. The symptoms of diseases, very exactly described by Ibn Waḥšiyya, correspond to anthracosa, rust and jaundice; the remedy prescribed drew its inspiration from the curative panacea, namely a mixture of oil, wine and water applied to the stock of the exposed level; Ibn Ḥaǧǧāǧ added straw there, which moreover protected against frosts.

Without our being able to furnish for all the Muslim countries the same precise details as for Spain and ʿIrāḳ, we can assert, thanks especially to the geographers' information, the presence almost everywhere of the vine, at least until the nomad invasions of the later Middle Ages, and often later: in Arabia, Mesopotamia, Iran, Central Asia, Syria, Egypt; in the Mongol period, Mustawfī Ḳazwīnī was still to see in Turkish Asia Minor the vines inherited from the Armenians and Greeks. The princely courts never had difficulty in providing wine, and the poets who used to sing of it must have had some acquaintance other than theoretical. The Crusaders must have developed the vine on the Syrian coast. There is no doubt, however, that the vine declined at the end of the Middle Ages, as much through the growth of strictness and conversions as through the interference of nomads. On the other hand, without it being possible here to make more than one passing allusion, it is known that the conditions of European colonization and international modern commerce led in certain Muslim lands, in particular in North Africa, to the development of new vineyards on some almost completely new bases, whose monocultural character, often excessive, in its turn presents some difficult problems of re-adaptation today.

(L. Bolens, Cl. Cahen)

Irrigation

The present article covers the religio-magical and the Islamic legal aspects of water, together with irrigation techniques, as follows:

1. Hydromancy

As a vehicle for the sacred, water has been employed for various techniques of divination, and in particular, for potamonancy (sc. divination by means of the colour of the waters of a river and their ebbing and flowing, consulted for divinatory reasons); for pegomancy (sc. omens given by rivers, springs, floods, a feature of Babylonian divination); hydromancy (called *istinzāl*); lecanomancy (sc. divination from the waves set up on any shiny, liquid surface, such as water, blood, milk, honey, oil or petroleum); and crystallomancy and cataoptromancy (sc. omens drawn from the features appearing upon any polished, reflecting surface).

The lack of perennial water courses in Arabia and the infrequency of springs prevented the development of such divi-

natory techniques as these amongst the Arabs. We have nothing to confirm that the reflective surfaces of waters in oases were ever used for these. Water, like perfume, was used in the rituals over the making of pacts and alliances, but these procedures had no divinatory character at all.

(T. FAHD)

2. WATER IN CLASSICAL ISLAMIC LAW

In Islamic law there are seven kinds of water which it is lawful to use for drinking or ablution: water from rain, snow, hail, springs, wells, rivers and the sea. These sources may, however, be rendered impure by the presence in them of unclean objects.

Questions of ownership and the right to take water depend on the nature of its source, whether natural or artificial watercourses, wells or springs (freshwater lakes are not generally discussed in the sources owing to their scarcity in the Islamic lands). Ownership of a source of water implies ownership of its *ḥarīm* (reserved area), consisting of that portion of land adjacent to the water source sufficient to enable the source to be used. One *ḥadīth* defines the extent of the *ḥarīm* of a well as 40 cubits on every side, but other measurements are also given.

The *Sharīʿa* distinguishes three types of water source which may be the subject of use or ownership:

1. Water from rivers, which may be (a) great rivers, such as the Tigris and Euphrates, which are of such a size that they can be used by all for drinking and irrigation to any extent; (b) lesser rivers, in which case two possibilities may be distinguished:
   (i) where there is generally enough water for all users but where it is possible to cause shortage to other users by e.g. digging a canal to take water from higher up the river than other users (whether this is allowed or not must be decided after inquiry into the consequences); or
   (ii) where damming or the allocation of fixed times is necessary to provide enough water for irrigation. In such cases, the river is normally regarded as the joint property of the riparian cultivators, and the question of how much water may be retained by the highest riparian cultivator depends on differing circumstances, such as the season of the year, the type of crop irrigated, etc. (c) canals. These are the property of the landowner or landowners in whose property they are situated; where they are the common property of several landowners, none of them may make unilateral changes in arrangements for sharing the water, or by building a mill or bridge over it, etc.

2. WELLS

(a) Wells dug for the public benefit; here the water is freely available to all, the digger merely having the right of first comer. (b) Wells dug by persons for their own use, e.g. wells dug in the desert by tribesmen. Such persons have first right to the water while they are living in the vicinity, but are obliged to give water to persons suffering from thirst. After they move away, the water becomes freely available to all. (c) Wells dug by persons intending them to be their own property. Ownership, however, cannot be claimed until water has actually been found, and if the well needs lining, until it has been

lined. The owner of the well has a duty to give water to anyone suffering from thirst. This is illustrated by a tradition which records that ʿUmar made some owners of water pay the *diya* for a man who died of thirst after they had refused his request for water.

3. Springs

(a) Natural springs: these are treated as analogous to permanently flowing rivers. If the water supply is limited, the first person to undertake irrigation in the area has priority; otherwise the water has to be shared equally. (b) Springs opened up by digging: the person who does this becomes the owner, together with the surrounding *ḥarīm*. (c) Springs opened up by persons on their own property. In such cases, the only claim against the owner is that of persons suffering from thirst. If the owner has a surplus of water, he may be obliged to give it gratis to other men's cattle, but not for irrigating crops.

A person who possesses water in a vessel is its sole owner, and he is not obliged to give it to others gratis; he is, however, obliged to relieve someone suffering from thirst in return for a recompense.

(M.J.L. Young)

3. Hydraulic Machines

There is ample evidence from written and archaeological sources for the widespread use in pre-Islamic times of all the main hydraulic machines, described below, in all the areas that were to form part of the Muslim world. The *shādūf* was known in ancient times. The *sāḳiya*, although it did not become fully effective before the introduction of the pawl in the 4th or 5th century A.D., was known in Roman times. Both machines are still in use today. The noria (*nāʿūra*) and the vertical undershot mill-wheel are both described by Vitruvius, without any claim to originality. Vertical mill-wheels were sometimes mounted on boats moored to the banks of rivers. The origins of the horizontal, vaned mill-wheel are still obscure: it may have been referred to by a Greek writer of the 1st century B.C., and it was in use in Ireland in the 7th century A.D. It is described in a Byzantine treatise, probably of the 7th century A.D., extant only in Arabic versions. Hand-operated force pumps were used by the Greeks and Romans; these had single vertical cylinders that were placed directly in the water without suction pipes. The problem of the origins and diffusion of these machines is largely unresolved, but our chief concern here is that they were all in existence in the 1st/7th century.

The *shādūf* is a simple machine consisting of a wooden beam pivoted on a raised fulcrum. At one end of the beam is a bucket, at the other end a counterweight. The bucket is dipped into the water, then the beam is rotated by means of the counterweight and the contents of the bucket are emptied into a cistern or supply channel. The flume-beam swape is a development of the *shādūf*. Instead of a solid beam, a channel is connected rigidly to the bucket; when this is raised the water runs through it into the outlet.

The *sāḳiya* is more complex, and indeed has over two hundred components parts. It consists essentially of a large vertical wheel erected over the water supply on a horizontal axle. This wheel carries a chain-of-pots or a bucket chain. On the other end of its axle is a gear-wheel that engages a horizontal gear-wheel to which the driving bar is attached. The animal is harnessed to the free end of this bar, and as it walks in a circular path, the gears and the wheel carrying the chain-of-pots rotate. The pots dip in succession into the water and when they reach the top

of their travel they empty into a channel. The noria (sometimes confused with the *sāḳiya*) is a large wheel driven by water. It is mounted on a horizontal axle over a flowing stream so that the water strikes the paddles that are set around its perimeter. The water is raised in pots attached to its rim or in bucket-like compartments set into the rim. The large norias at Ḥamāt in Syria can still be seen today; the first known mention of norias at Ḥamāt is by Aḥmad b. al-Ṭayyib in 271/884–5.

The Vitruvian mill-wheel turns a vertical gear-wheel that meshes with a horizontal gear-wheel to which the driving shaft is attached. The horizontal vaned mill-wheel is fixed directly to the driving shaft; there are no gears. It cannot be mounted directly in the stream since the water must be directed on to its vanes from a pipe or channel.

There can be no doubt that all these machines were in continuous use in Islam from the early conquests until the introduction of modern technology. (As mentioned above, the *s̲h̲ādūf* and the *ṣākiya* are still in use; they are cheaper and more easily maintained than motor-driven pumps.) The evidence comes from treatises on machines, references in the works of historians and geographers, and archaeological investigations. The remaining discussion will be confined to developments of particular importance in the history of technology.

Mills were used in Islam for other purposes beside the grinding of corn and other seeds, e.g. for crushing sugar cane and for sawing timber. This suggests that rotary motion was converted to reciprocating, probably by means of trip-hammers. More examples of similar applications may be discovered when a systematic study of the historical and geographical works is undertaken. Another area of interest is the use of the overshot mill-wheel, in which the water is conducted through a channel to the top of the wheel, which has bucket-like compartments around its rim. The overshot wheel works mainly by the weight of the water, whereas the Vitruvian one is operated by its force. In many conditions, the former is the more efficient of the two. Its use is recommended by a certain Murādī in a treatise composed in Andalusia in the 5th/11th century. In this paper the treatise was wrongly attributed to the well-known astronomer Ibn Muʿād̲h̲). S̲h̲ams Dīn al-Dimas̲h̲ḳī, d. 727/1327, describes a similar wheel in operation near Tabrīz. The overshot wheel did not come into general use in the West until about the 8th/14th century. Al-D̲j̲azarī often uses small overshot wheels in his devices, but these are usually scoop-wheels, a kind of primitive Pelton wheel, the scoops being fixed to the ends of spokes that radiate from a solid disc.

It is reasonable to infer that the scoop-wheels used by al-D̲j̲azarī were miniature versions of wheels in full-size machines, an inference that is strengthened by the fact that he uses such a wheel in one of his water-raising machines. The visible part of this is a *ṣāḳiya*, which is provided with a model cow to give the impression that this is the source of motive power. The actual power, however, is provided in a lower, concealed chamber and consists of a scoop-wheel and two gear-wheels. This system drives the vertical axle that passes up into the main chamber, where two further gear-wheels transmit the power to the chain-of-pots wheel. Such devices (without the model cow) were in everyday use. A similar machine was in continuous use on the River Yazīd above Damascus from the 7th/13th century until about 1960 for water supply and irrigation. It was restored to working order by the staff and students of Aleppo University.

It should be apparent from the foregoing brief discussion that Islamic engineers were active in the construction and development of hydraulic machines for water-raising and power supply throughout the mediaeval period and beyond. Similar activity took place in Europe, India and East Asia. Each region used the machines that were best suited to its needs, to the local hydraulic conditions, and to the available constructional materials.

(D.R. Hill)

4. Pre-20th century Irrigation in Egypt

Until the 20th century, irrigation in Egypt remained much as it had been in Pharaonic times. The continuity of practice stemmed from the dependence on the annual Nile floods, which provided Egypt not only with water for irrigation but also with the alluvial soil deposits to renew the fertility of the cultivated lands. The great river, however, does not only bestow its gifts, but may also be the cause of misfortune to the country. Up to modern times and before major dams and irrigation projects were undertaken, a high Nile promised the richest increase to the fields, while with a low Nile came the inevitable dread of a year of famine.

ʿAbd al-Laṭīf al-Baghdādī (d. 629/1231) discussed this phenomenon and the rôle of the Nile in the irrigation and the agricultural situation in mediaeval Egypt. He states that after the water of the Nile overflowed and covered the soil for several days, it receded to let the peasants plough and sow the fields. No further irrigation was needed until the crops were ready to be harvested. If the Nile exceeded some fingers beyond 20 cubits (*dhirāʿ* s), some areas became submerged like lakes for a long time and the proper time for sowing passed without calculation being possible. Also, lands could not be cultivated if the Nile did not rise sufficiently to reach the minimum of the necessary flood (16 cubits). In such cases, the amount of land covered with water was insufficient, the size of the crop did not meet the needs of one year and there was a scarcity of food more or less great in direct ratio to the water level above or below sixteen cubits.

No one in pre-20th century Egypt felt secure before the flood reached the height of 16 cubits and when all necessary land had been naturally irrigated by the Nile. Until it reached that level, the news of its height was kept secret from the common people. It seems that this was a custom introduced by the Fāṭimid Caliph al-Muʿizz in 362/973, when he prohibited the announcement in the streets of Cairo of the exact rising of the Nile before it had reached 16 *dhirāʿ*s. This was to prevent tension, fear and financial crises among the inhabitants. The person who was in charge of the Nilometer (*ṣāḥib al-miḳyās*) used to call the increasing level of the Nile water in fingers without telling the exact cubit. Only when the water level reached the height of 16 cubits, normally in the Coptic month Misrā (July–August), could the *ṣāḥib al-miḳyās* proclaim it to the people in Cairo, and the sultan then had the right to impose the *kharādj* on the cultivated land.

Pre-20th century irrigation in Egypt did not rely only on the floods, but also on the yearly digging and cleaning of the irrigation canals and the maintenance of the irrigation dams. Both al-Nuwayrī and al-Maḳrīzī state that without such maintenance there would be little benefit from the Nile. Al-Maḳrīzī (i, 74–5) traces the importance of canals and irrigation dams in controlling the Nile in pre- and early Islamic periods. It was one of the most important functions of both the sultans

and the holders of the *iḳṭāʿs* under the Ayyūbids and the Māmlūks to dig and clean the canals and to maintain the irrigation dams (the *ḏjusūr*). The sources provide us with ample information about the efforts of the sultans in Egypt in digging and cleaning canals. The irrigation dams (the *ḏjusūr*), which were of paramount importance for the irrigation of the fields, were classified into two types in mediaeval Egypt: the small irrigation dams (*al-ḏjusūr al-baladiyya*) and the great irrigation dams (*al-ḏjusūr al-sulṭāniyya*). The first were important for conveying water from one field to another in the village. Each *muḳṭaʿ* (holder of an *iḳṭāʿ*) with his clerks was responsible for the upkeep of these irrigation dams within the confines of his *iḳṭāʿ*. As for the great irrigation dams which were constructed for the benefit of the provinces, the sultan was responsible for them, at least in theory. In practice, especially under the Mamlūk sultans, the *muḳṭaʿs* assisted the sultan in the construction of this type of dam by supplying peasants, oxen, harrows and tools.

Because of the importance of the great irrigation dams, both the Ayyūbid and the Mamlūk sultans used to select distinguished and able *amīrs* and officials to supervise the work of their maintenance. Al-Nābulusī (d. 660/1261) states in the *Kitāb Lumaʿ al-ḳawānīn al-muḍiyya* that every year the Ayyūbid sultan al-Malik al-Kāmil used to send him with 3 or 4 *amīrs* to the Djīza province during the flood period in order to keep the dams of that province in good condition. It seems that the Ayyūbid sultan sent officials like al-Nābulusī to other Egyptian provinces for the same purpose. Under the Mamlūks there was an office called *kashf al-ḏjusūr* (office of inspection of irrigation dams) for each province in Egypt. The holder of this office, called *kāshif al-ḏjusūr*, was an *amīr* who was aided by assistants in the construction and maintenance of the irrigation dams in the province under his charge.

Each year before the advent of the Nile flood, not only had the canals to be dug and the irrigation dams to be constructed and repaired, but also the land to be cultivated had to be prepared. The methods of that preparatory work as well as the tools used were more or less the same traditional ones known to have been used by the Egyptian peasants for thousands of years. As for irrigation, al-Nuwayrī and al-Maḳrīzī state that when the Nile rose during the flood period, the water covered all cultivated lands. One could only reach the villages, which were established on hills and mounds, by boat or on the great irrigation dams. When the soil had had sufficient water, the *khawlīs* (stewards) and the *shaykhs* (village headmen) supervised the cutting off of the irrigation dams from specified places at certain times in order to draw off water from the fields, thus letting it flow benefit other places.

The crops which were cultivated after the Nile flood season in mediaeval Egypt did not need any more irrigation than their inundation during the flood period. This was the most common method of irrigation, called *bi 'l-sayḥ* by al-Nābulusī. The last term is still used by the contemporary *fallāḥ* to denote irrigation without artificial implements. Crops watered in this manner were called "winter crops" in order to distinguish them from the summer ones which the peasants began sowing during the Coptic month Baramhāt (February–March) and which relied on irrigation by artificial means such as water-wheel, shadoof.

Al-Makhzūmī and al-Maḳrīzī distinguish between the winter and summer crops when discussing the times of sowing and harvesting. al-Makhzūmī states that the winter crops were wheat (*ḳamḥ*), barley

(*sh.a'īr*), beans (*fūl*), bitter-vetch (*djulbān*), lentils (*'adas*) and flax (*kattān*). al-Maḳrīzī adds to al-Makhzūmī's list of winter crops chick peas (*ḥummuṣ*), clover (*ḳurṭ*), onions (*baṣal*), garlic (*thūm*) and lupin (*turmus*). For summer crops al-Makhzūmī mentions unripe melons (*faḳḳūs*), watermelons (*biṭṭīkh*), kidney beans (*lūbiya*), sesame (*simsim* or *samāsim*), cotton (*ḳuṭn* or *aḳṭān*), sugar-cane (*ḳaṣab al-sukkar*) and colocasia antiquorum (*ḳulḳās*). Although al-Maḳrīzī lists the same for summer crops, he adds aubergines (*bādhindjān*), indigo (*nīla*), radishes (*fudjl*), turnips (*lift*), lettuce (*khaṣṣ*) and cabbage (*kurunb*), and puts both the unripe melon and water-melon under the one name *biṭṭīkh*.

There were many methods known in pre-20th century Egypt to irrigate the soil under the summer crops. They were inherited from older times and continue until today, with the exception of one which was very primitive and arduous. This was the transportation of water to the fields in buckets, jars, etc., hung from the necks of the oxen. This method was mentioned by al-Nābulusī as the means of irrigation for the two villages Dimashḳīn al-Baṣal and Damūh, known as Kūm Darī, in the Fayyūm province. This method, which was a continuation of a Pharaonic technique, seems to have been known in other Egyptian villages.

The other methods of irrigation used by the mediaeval Egyptian peasant employed any one of four artificial irrigation contrivances, namely, the *naṭṭāla*, the *dāliya*, the *sāḳiya* and the *tābūt*. These four contrivances were used in Egypt before the advent of the Arabs and are still in current use.

There is no mention of what was known as the *naṭṭāla* in the available classical sources, but the existence of such a device in Ancient Egypt, as well as its depiction in the *Description de l'Égypte, État moderne*, (Paris 1817), proves its existence in pre-20th century Egypt. It is still in use in Egypt, as well as in many African countries. Two men stand face to face, each holding two cords of palm-fibre ropes to which is attached a wide, shallow waterproof basket. This basket, made from twisted palm leaves or leather, is known in Egypt by the name *ḳaṭwa*. The two men holding the ropes bend slightly toward the water, dip the basket and fill it. Then they straighten while turning to the field, thus raising the basket which is emptied into the mouth of the irrigation canal.

The *dāliya* or shadoof is a kind of drawwell which was used in Pharaonic Egypt and in mediaeval 'Irāḳ, and is still used in Egypt and other eastern countries for raising water for irrigation. It usually consists of two posts, beams of the acacia tree or shafts of cane, about five feet in height. These posts are coated with mud and clay and then placed less than three feet apart. The two beams are joined at the top by a horizontal piece of wood, in the centre of which a lever is balanced. The shorter arm of the lever is weighted with a heavy rock or dried mud, while at the end of the longer arm hangs a rope carrying a leather pail. The peasant stands on a platform on the river bank and pulls down the balanced pole until the pail dips into the water and is filled. A slight upward push, which is helped by the counterweight, raises the bucket above the irrigation canal, into which it is emptied.

As for water-wheels, al-Muḳaddasī (4th/10th century) states that there were many *dawālīb* (pl. of *dūlāb*, a Persian word which denotes a water-wheel) on the banks of the Nile for irrigating orchards during the low waters. In the next century, Nāṣir-i Khusraw mentions in his *Safar-nāma*, that "up the Nile there are different cities and villages, and they have established so many *dūlābs* that they are difficult to count."

In mediaeval Egypt, there were two words used to denote wooden water-wheels, i.e. the *sawāḳī* (sing. *sāḳiya*) and the *maḥāl* (sing. *maḥāla*). al-Nābulusī mentions that some villages in the Fayyūm province had *sawāḳī* to raise irrigation water. In Bāḏja, for example, he states that there were *sawāḳī* which were running day and night. Al-Nābulusī warns the Ayyūbid Sultan al-Malik al-Ṣāliḥ Ayyūb of the negligence and dishonesty of officials with which his own long experience in the work of offices had made him conversant. Specifically, he reports that acacia trees, which were a state monopoly, have been illegally cut down to construct *sawāḳī*, presses and other instruments.

Al-Nuwayrī, writing in the Mamlūk period, states that wells were dug in the land, apparently supplied by water from the underground bed of the Nile. At the mouth of these wells the *sawāḳī*, made from acacia or other trees, were installed. Al-Nuwayrī also states that these irrigation wheels were called *al-maḥāl* in Egypt, while at Hamā in Syria they were called *al-nawāʿīr* (sing. *nāʿūra*). He differentiates, as does al-Ḳalḳashandī in a later period, between the two kinds, by stating that the *nawāʿīr* were run by water current, while the *maḥāl* by oxen.

The Arabic word *maḥāl* (sing. *maḥāla*) denotes the huge pulley which is used for raising water from wells. However, al-Maḳrīzī uses it to refer to the water-wheel. When discussing the irrigation of sugar-cane when the Nile water is low, al-Maḳrīzī says that each of these *maḥāl* can raise the water to irrigate eight *faddāns* of sugar-cane, providing that the water-wheel is installed close to the Nile and that eight excellent beasts are available to work it. When the wells are established at a distance from the Nile, each of the *maḥāl* cannot irrigate more than 4 to 6 *faddān*s. Al-Maḳrīzī also refers to the *ḳādūs*, which al-Muḳaddasī earlier explained as the bucket of the water-wheel.

It is apparent that the ordinary, contemporary Egyptian water-wheel is more or less the same as the mediaeval one, since it does not differ appreciably from the one depicted in the *Description de l'Égypte, État moderne*. The flat horizontal wheel of the *sāḳiya* is turned counter-clockwise by a single beast or pair of oxen. The flat wheel's rough cogs engage a vertical wheel which carries a long chain of earthen pots (*ḳawādūs*). These clay pots are suspended from ropes and are lowered, mouthdownward, into the water. Following the path of the wheel, the pots scoop up water which they spill out into the irrigation channel as they arrive at the top of the wheel on their circular journey. The work of the peasant or his son is to goad the beast, to watch the turning wheel, and to avoid wasting water on the way to the field.

As for the *tābūt* (water-screw), it was apparently invented by the Greek mathematician and inventor Archimedes (*ca.* 287–212 B.C.) while studying in Egypt. Observing the difficulty in raising water from the Nile, he is said to have designed this screw to facilitate the irrigation of the fields.

The water-screw has been continuously in use in Egypt when the level of water is not very low, from the times of the Ptolemys until the present. It consists of a wooden cylinder (about 6–9 feet in length) hooped with iron. While the spiral pipe is fixed between the inside wall of the *tābūt* and an iron axis, its upper extremity is bent into a crank and its lower end turns on a stake set under the water. One or two peasants crouch at the water's edge, endlessly turning the crank handle. The water rises from bend to bend in the spiral pipe until it flows out at the mouth of the canal.

However, using the primitive implements of the *naṭṭāla*, the *dāliya*, the *sāḳiya* and the *tābūt*, the pre-20th century peasant in Egypt irrigated the land and managed to produce the necessary crops to maintain the economy of the country. Many of the techniques and implements that he devised or used have proved to be efficacious to such a degree that they are still extant.

(Hassanein Rabie)

5. Irrigation in ʿIrāḳ

Since it is impossible here to look at the use of water in all its aspects and in regard to all the problems which it raises, the present section merely deals with irrigation in the same way as is done for other regions of the Islamic world.

Taken as a whole, ʿIrāḳ is a flat plain irrigated by two great rivers, whose risings and fallings lack however the comparative regularness of the Nile. Since the Euphrates (al-Furāt) flows at a higher level than that of the Tigris (Didjla), the canals which, from ancient times, have connected them run at an oblique angle in relationship to them. Aerial photography, together with other sources of information, has allowed Adams to supplement and complete, for the left bank of the Tigris, the information of the mediaeval authors and, especially, of Ibn Sarafyūn (Serapion). In regard to the zone between the two great rivers, periods of neglect before and after the coming of Islam have transformed part of central ʿIrāḳ into a marshland, the Baṭīḥa, the drainage of which has not been possible. The rivers and the great canals, constructed and maintained by the state, were important routes for communication, which were not impeded by the bridges of boats across them or by the mills. The upkeep of the smaller canals was the responsibility of local people. An ancient system of customary law regulated the amount and the periods of water used amongst the holders of land along the banks, and specially-appointed officials had the task, through the manipulation of sluices and water-gates, of securing this regulation. The interest shown about irrigation questions by mediaeval authors arises from the fact that, both for the land-tax and for local dues, irrigated land was distinguished from non-irrigated land.

The anonymous author of the *Kitāb al-Ḥāwī* (5th/11th century) has provided us, in the shape of mathematical problems, with some interesting details about the administration of the canals and about hydraulic machinery in mediaeval ʿIrāḳ. He describes various kinds of water-wheels, *dawlāb*, *g̲harrāfa*, *sh̲ādh̲ūf*, giving their capacity for drawing up water and then spreading it for irrigation purposes, according to the season, and the numbers of men and animals required to work them. Then he moves on to the "balancing out of ground" intended to fix the levels of canals which have to be dug out. Finally, he raises the question of the construction and upkeep of the raised canal banks, which he calls *bazand*, a pre-Islamic term not listed in the classical dictionaries, hence often wrongly read. It is necessary to know the volume of earth, reeds and brushwood which has to be transported, which is counted according to a special unit, the *azala* = 100 cubic cubits "of balance", and it is to be understood that an *azala* is procured by 33 "spade loads", handled by two men, one digging and the other transporting the earth, etc. in sacks. The provision of materials and the labour, which seem never to have been done by slaves, are paid according to an official tariff.

(Cl. Cahen)

6. Irrigation in Persia

The distribution and density of population and the development of agriculture in Persia throughout history have been closely dependent upon the availability of water, and the nature of the irrigation systems has influenced both the siting of settlements and the pattern of society. Precipitation is scanty and seasonal; it is concentrated on the periphery of the country, as also are the major perennial rivers.

As a general rule, rainfall, which occurs between October and May, decreases from the north to the south of the country and from west to east, but in a number of areas the high relief of the Alburz and the Zagros mountains has modified this pattern. Along the Caspian Sea coast and the northern flanks of the Alburz, precipitation reaches more than 1,800 mm. near the mouth of the Safīd Rūd; annual totals fall to less than 500 mm. on the east side of the Caspian near Gunbad-i Ḳābūs. Along the western flanks and summits of the Zagros Mountains, precipitation amounts are thought to exceed 800 mm. on some of the higher peaks, and large areas to the west of Shīrāz receive more than 400 mm. In the north-western highlands, between the two belts of high precipitation, there is a zone of moderate precipitation of 250–400 mm. In the centre of the country occupied by the Dasht-i Kawīr and the Dasht-i Lūṭ, great sterile deserts, precipitation totals almost everywhere less than 100 mm., though a higher precipitation is found on the eastern borders of the *kawīr* in the highlands around Bīrdjand and Zāhidān. Everywhere, with the exception of the Caspian littoral, low and episodic rainfall is a major constraint on agriculture, hence the importance of artificial irrigation.

Dependable supplies of surface water exist only in isolated districts around the margins of the country, but there is nowhere an annual surplus of water, and seasonal surpluses, except in the north and west, are insignificant. Run-off is episodic, and occurs only because precipitation momentarily exceeds the infiltration capacity of the surface. The flow of water in streams and rivers throughout the country is seasonal and highly variable from year to year. Peak flows are too late for winter crops and the minimum discharge occurs when summer crops are in greatest need of moisture. The control of water by artificial irrigation is therefore immensely important for agricultural production and prosperity. Without artificial irrigation the cultivation of plants native to regions where summer rainfall is normal, such as cotton, millet, rice and sugar would not be possible.

There are few great rivers in Persia—the great hydraulic civilisations have no place there. The largest are the Kārūn and the Karkha which flow into the Persian Gulf, draining almost all the area between Ābādān and Kirmānshāh. Further south are the basins of the Mand and the Shūr, which also drain into the Persian Gulf and the Gulf of Oman respectively. The Safīd Rūd flows into the Caspian, as also do the Aras and the Atrek. The water of the two last-named, which flow along the modern Russo-Persian border in the north-west and the north-east respectively, is shared with Russia. The central zone of Persia, covering the largest part of the country, is an area of internal drainage. Small rivers flow into the closed basins of Lake Urumiyya (Riḍā'iyya) in Ādharbāydjān, into the Hāmūn in Sīstān and into dry lakes and saline marshes in structural basins in the East Zagros, the depression between the Zagros and the volcanic axis extending from Ḳumm to Kirmān, the Djaz Muriyān basin, the southern Lūṭ, Balūčistān, the eastern highlands north

of Bīrdjand and in the frontier zone with modern Afghānistān. South-west of the central desert is the basin of the Zāyanda Rūd, which supports Iṣfahān and to the south of this, the basin of the Kur. The discharge of most streams in the central zone is small. Many of the larger streams, gathering in high mountains, have steep and irregular profiles. Leaving the mountains, they dwindle quickly as a result of evaporation, seepage and diversion for irrigation, leaving dry channels, the underflow of which now and then supports an exotic agricultural efflorescence. From ancient times, the water of these rivers and streams has been used for irrigation and has formed the basis on which flourishing civilisations have been established in pre-Islamic and Islamic times. The history of the water use of the Kur in the Marwdasht plain illustrates the importance of the role played by irrigation in the establishment of the early Persian empires in that region and the changes in the prosperity of the region and the density of settlement which took place over the centuries as a result of fluctuations in the upkeep of dams and irrigation channels. For the most part, the rivers flowing into the southern end of the Caspian Sea, apart from the Oxus appear to have been less used for irrigation in early and mediaeval times than the rivers in central, southern and eastern Persia. Ḥamd Allāh Mustawfī states that little of the water of the Djurdjān River was used for irrigation and most of it ran to waste. Similarly, hardly any of the water of the Safīd Rūd was used for irrigation, except for that little which watered the lands lying immediately along its bed; most of it was wasted; and the same, he alleges, was true of its tributary, the Shāhrūd, though this was not so in the case of the rivers of the two Ṭārums, which also flowed into the Safīd Rūd: in summer most of their waters were used for irrigation and little flowed into the Safīd Rūd.

The smaller basins of the arid centre of Persia and the south-east, together with the fringes of the *kawīr*, receive incoming water mainly by piedmont seepage of many small ephemeral streams. The traditional method of tapping this water is by *ḳanāt*, which, with its associated network of canals, is characteristic of irrigation on the Persian plateau; hence too the frequent siting of settlements on gentle slopes some distances from the foot of the hills that feed the *ḳanāt*s. From earliest times, the material basis of the population on the Persian plateau has been provided by *ḳanāt* water. The various systems of irrigation—by river, *ḳanāt*, spring or storage dam—are not mutually exclusive; many districts use more than one.

The configuration of settlements has been decided in many cases by the nature of the water supply. Where water is scarce, villages tend to be concentrated; elsewhere they may be more scattered. They frequently flank water-courses and cluster about the outlet of *ḳanāt*s or round springs. The area immediately round a town or village is usually intensively cultivated with irrigation—even in the dry farming regions there is often a small irrigated area in or near a town or village. Beyond the cultivated land there is sometimes a periphery of marginal land which may be cultivated in years when the water supply is extraordinarily plentiful. Similarly, mountain villages in regions where the rainfall is sufficient for cultivation usually have an irrigated area, however small. In mountain valleys, the villages tend to be situated on rocky slopes rising above the intensely cultivated valley floors or to straggle along the mountain streams. Mountain slopes are often skilfully terraced, and much time and labour is expended on the construction and repair

of dry stone retaining walls for the cultivated plots. The need for regular attention to the upkeep of irrigation works has, further, been an important factor in making the village, rather than the isolated farmstead, the typical form of settlement throughout most of Persia.

Artificial irrigation may already have existed in late Neolithic times. By the Achaemenid period, there was an extensive network of *ḳanāt*s, and with the extension of irrigation there was an expansion of agriculture. It is probable that drainage schemes were also undertaken in different parts of the empire. Later, the Seleucids brought more land under cultivation by clearance and drainage and applied new techniques to irrigation. In Islamic times, control of water for irrigation remained crucial to prosperity and settlement.

Such control is a highly complex matter, and requires for its successful implementation not only technical skill but also political stability. The heavy load of solids carried by streams in spate makes storage and control both difficult and costly. Flash floods often destroy irrigation works, especially those connected with *ḳanāt*s, while spring floods may also cause much damage in lowland districts. On the plateau, the lowering of the stream-beds through normal erosion results in the lowering of the water-table itself and leaves irrigation canal intakes above the new water level. In modern times, the lowering of the water-table by the extraction of water by pump operation connected with the sinking of semi-deep wells has led to many *ḳanāts* falling into disuse, especially round the central desert but also in other regions. Inadequate drainage, on the other hand, often leads to a rising water-table under irrigated lands, water-logging, salinisation and alkalinisation, which result in considerable loss of output. These processes vary widely in different districts and different years. In some regions, notably Khūzistān and Sīstān, deterioration of the soil because of a change in the water-table due to over-lavish irrigation and inadequate drainage, or both, has been a major problem. Another problem is that ground water in some districts may be heavily charged with soluble salts and be too saline for use in irrigation. This is the case in many districts on the borders of the central desert and in the Persian Gulf littoral.

Natural conditions and agricultural practices cannot alone, however, explain the fluctuation in the history of irrigation in Persia. The shifting of centres of political authority which accompanied dynastic changes and demographic changes resulting from invasion and the increase in dead lands because of the slaughter or flight of their inhabitants have also played a part. A breakdown in the control of water, for whatever reason or reasons, was inevitably followed by a decline in prosperity. The decay of Khūzistān, which culminated under the ʿAbbāsids, is an illustration of this. Under the Sāsānids, the waters of the Karkha, Diz and Kārūn had been utilised by an elaborate system of barrages, tunnels, inverted syphons, lifting devices and canals. Cereals, sugar cane, rice and dates were produced in abundance. In the last fifty years or so of Sāsānid rule, irrigation was neglected. Under the rule of the Orthodox Caliphs and the Umayyads, adequate attention was not paid to artificial drainage of the irrigated land, and under the ʿAbbāsids the province declined—rising water-tables under irrigated land may have been responsible for the attempts of the ʿAbbāsids to irrigate new lands of poorer quality. Water-logging, alkalinisation and salinisation, and the hazards of flood, all contributed to the decline of the region which occurred in post-ʿAbbāsid times. Changes in pros-

perity in other regions brought about by a failure to control irrigation have been, perhaps, less spectacular but none the less important. The decay of irrigation and drainage not only resulted in an increase of waste and unproductive land, but may also have led to the spread of malaria, thus contributing to a decline in population and output.

Water utilisation: technical features

Irrigation works, plain take-offs, dams, weirs, lifting devices, artificial reservoirs and *ḳanāt*s, supplemented by principal and secondary canals, are to be found all over the country; and some are ancient structures.

(i) *Dams*

Several large dams existed in Khūzistān in Sāsānid times, including the bridge dams at Shūshtar and Dizful, built by Shāpūr I and Shāpūr II or Ardashīr II respectively, the dam on the Djarrāḥī near Khalafābād, and the dam on the Mārūn at Arradjān. They continued in use for varying periods after the fall of the Sāsānids. Repairs and reconstructions were numerous, and the Romano-Sāsānid work at Shūshtar and Dizful was partially replaced by pointed-arch bridges. The dam at Shūshtar, known as the Band-i Mīzān, had a length of 1,700 ft. and raised the water to the level of the city of Shūshtar, which was situated on a rocky outcrop on the east bank of the Kārūn. The dam was built partly by Roman prisoners of war taken in Shāpūr I's victory over Valerian in A.D. 260. It had a rubble masonry core set in hydraulic mortar; the facing was of large, cut masonry blocks, held in place by both mortar and iron clamps set in lead. It was pierced by numerous sluices for the purpose of releasing water in time of excessive flow. It took three years to build, during which time the Kārūn River was diverted through two by-pass channels. One of these, the Āb-i Gargar, winds its way south for some twenty-five miles and then rejoins the Kārūn. When the work of the dam was completed, the entrance to the Āb-i Gargar was closed by a second dam, the Ḳayṣar dam. This was made of large stone blocks mortared and clamped together, and six sluices were provided to control the flow of water into the Āb-i Gargar. Part of the bridge at Shūshtar and the Band were swept away by floods several times during the 19th century. Muḥammad ʿAlī Mīrzā, when governor of Kirmānshāh, undertook repairs to it in the early 19th century. When Curzon visited Shūshtar in 1889, there was a gap of over seventy yards in width in the middle of the bridge, which had been swept away by a flood in 1885. The efforts of Niẓām al-Salṭana, the governor of ʿArabistān, to repair it proved abortive. A further canal, the Miyān Āb canal, was cut, apparently to divert water through a tunnel made in the face of the castle rock in order to irrigate the high-lying lands to the south of the city, the level of the water of which was regulated by dams. As a result of the rupture in the Band-i Mīzān and the bridge, the river bed was lowered at the point where it formerly fed the canal and the land which is was intended to irrigate became derelict.

The Dizful dam, a replica of the Shūshtar dam, was 1,250 ft. long. When Curzon visited Dizful, the dam was in a dilapidated condition, two of its arches having recently fallen in. After it fell into decay, all local irrigation depended upon rough dams of stone and brush-wood, which were reconstructed after every flood.

South of Shūshtar, where the Āb-i Diz and the Āb-i Gargar flow into the Āb-i Shutayt, the main channel of the Kārūn, another Sāsānid dam, the Band-i Ḳīr, of which only the name survives, was

located. The name is of interest because it suggests that bitumen (*kīr*) may have been used to make the dam watertight and solid. Another dam on the Āb-i Gargar, called the Pul-i Bulaytī, was added to the Shūshtar system in Islamic times. This was a power dam; mills were installed in tunnels cut through the rock at each side of the channel, the dam providing the necessary head of water to drive the mill wheels. A third bridge dam was built, also in Sāsānid times, over the Karkha at Pā-yi Pul. It fell out of use when it burst in 1837. Its remains were seen by Sir Aurel Stein in 1938.

At Ahwāz, there was another great dam (but not a bridge dam), probably over 3,000 ft. long. and about 25 ft. thick. Its remains were to be seen until recently. Al-Muḳaddasī describes the dam as being wonderfully constructed from blocks of rock behind which the water was held back. He states that the water was divided into three canals, which watered the fields of the estates of the people of the city, and that without the dam Ahwāz would not have been populous and that its canals could not have been used. The collapse of the dam in the 9th/15th century brought ruin to the city.

Numerous storage dams and their remains are to be found in many parts of Persia. Although their overall contribution to irrigation was not as great as that of *ḳanāt*s, or of the dams in Khūzistān, they were of considerable local importance and enabled land which could not otherwise have been cultivated to become productive. One of the most interesting systems is that on the Kur River in Fārs, which has provided irrigation for the Kurbāl district to a greater or lesser extent for some 2,000 years. The most famous dam of this complex is the Band-i Amīr, built about 349/960 by the Būyid ʿAḍud al-Dawla, probably on earlier, possibly Achaemenid, foundations. Prior to its reconstruction, the water of the Kur could not be raised to irrigate Upper Kurbāl. Al-Muḳaddasī, who wrote soon after the dam was built, and Ibn al-Balkhī, who wrote rather under 150 years later, describe the dam in similar terms. The latter states that ʿAḍud al-Dawla brought engineers and workmen to the place in order to build the dam and spent much money on its construction. The dam was made of stone set in mortar, reinforced by iron anchors, which were set in lead. Upstream and downstream the river-bed was paved for several miles, and the supply canals extended for over ten miles, serving 300 villages in the Marwdasht plain. Ten water-mills were built close to the dam, the crest of which was wide enough to allow two horsemen abreast to ride across it. Upstream from the Band-i Amīr there were five other major dams for the irrigation of Lower Kurbāl. These included the Rāmdjird dam, built on Achaemenid foundations, which was almost as large as the Band-i Amīr, and five downstream, the last of which, the Band-i Ḳaṣṣār, was only a few miles from Lake Bakhtagān into which the Kur flows. By the 6th/12th century, the Band-i Amīr, the Band-i Ḳaṣṣār and the Rāmdjird dam had fallen into a state of decay and were repaired by the Saldjūḳ governor of Fārs, the Atābeg Djalāl Dīn Čawlī Saḳāw. The Rāmdjird dam was again rebuilt towards the end of the 6th/beginning of the 13th century, and there were several reconstructions after that date.

In the eastern provinces of Persia there were also a number of dams and irrigation works on the Oxus or Āmū Daryā and on other great rivers and lesser streams. Some of these were repaired, and others constructed by the Muslims. Sīstān was dependent almost wholly upon the control of the water of the Hīrmand (Helmund) River. Zarandj, the capital of the province

under the ʿAbbāsids, was situated near the original capital of Rām Shahristān (Abrashahriyār), which according to tradition, had been abandoned when a dam across the Hīrmand had burst and the water had been permanently diverted from the Rām Shāhristān canal. From the works of the Muslim geographers, it would appear that Zarandj was irrigated by six dams on the Hīrmand near where it enters Lake Zarab. Some of these may have been of Sāsānid origin. The Muslims added various water-wheels to the system. In 785/1383 Zarandj and its irrigation works were destroyed by Tīmūr, as was also the Band-i Rustam on the Hīrmand River near Bust, the water of which had served to irrigate all the western lands of Sīstān. Failure to repair and maintain the elaborate system of canals and dams on the Hīrmand River resulted in much of the land formerly irrigated and drained being converted into reed beds and swamps. The headwaters of the Hīrmand and the main stream are at the present day in Afghānistān. After entering Persian Sīstān, the river divides into two branches, the Pariyān and the Sīstān rivers. The former flows in a northerly direction, and with its tributaries waters northern Sīstān. The latter flows through southern and south-western Sīstān. Near the Afghān frontier, the Kahak dam diverts water into the Pariyān, while another dam lower down, the Band-i Zahāk, diverts more water for irrigation. The use of the water of the Hīrmand and the construction of new dams has been the subject of bitter controversy between Persia and Afghānistān. The first award of the river waters between them was made in 1872.

The water of the Murghāb River in Khurāsān was diverted by numerous dams and canals for irrigation. Al-Iṣṭakhrī relates that one march south of Marw, its bed was artificially dyked with embankments faced by wooden works which kept the river-bed from changing. Under the Saldjūḳs, the number of dams and dykes on the Murghāb was increased. These were later destroyed by the Mongols and the oasis of Marw converted into a desert swamp, according to Ḥāfiẓ Abrū. He states that after Tīmūr's conquest of Khurāsān, various of the *amīrs* and pillars of the state each made a canal leading off from the Murghāb, in order to irrigate the land, and that when he was writing, i.e. at the beginning of the 9th/15th century, twenty of these were in existence. He describes the city as being in a flourishing condition.

One of the most important periods in mediaeval Persia in the construction of dams appears to have been the Īlkhān period, when, in the late 7th/13th century and early 8th/14th centuries, several dams were constructed. The great achievement of this period was the construction of a number of arch dams. One at Kibar (Kivar), some 15 miles south of Ḳumm, is the oldest surviving example of this type of structure so far located. Built in a V-shaped gorge, which narrows about halfway down to a deep gully, the dam is 85 ft. high and 180 ft. long at the crest, the thickness of which is between 15 and 16 ½ ft. The air-face, the radius of curvature of which is 125 ft., is vertical except near the face where there is a slight slope in the downstream direction. The dam has a core of rubble masonry set in mortar (*sārūdj*) made from lime crushed with the ash of some desert plant, which makes it hydraulic and results in a strong, hard and highly impervious mortar ideal for dams. The dam has a vertical series of openings on the water-face connected by shafts and galleries to provide passage for the water through the dam walls (though their precise function is uncertain). Two other arch dams, probably also belonging to the Īlkhān period are situated near Ṭabas, the Shāh ʿAbbāsī, east-north-east

of Ṭabas, so called because it was repaired in the Ṣafawid period, presumably by Shāh ʿAbbās I or Shāh ʿAbbās II, and the Kurīt dam, to the south of Ṭabas. The latter is remarkable for its height of some 120 ft. Another dam, a large gravity dam at Sāwa, was also built in the Īlkhān period. Ḥamd Allāh Mustawfī states that it was constructed on the orders of Shams al-Dīn Muḥammad Ṣāhib-Dīwān. It was situated in a valley south-east of Sāwa and east of the point where the Ḳarāčāy (Gāvmāha) joins two streams from Sāwa and Āwa respectively. Although the limestone rock at the side of the valley was sound (as far as is known), the base of the dam was built on river alluvium consisting of sands and gravel, which go down 90 ft, before bed-rock is reached. Consequently, as soon as the reservoir began to fill, the pressure above the foundations drove the water through the alluvium and the water established a permanent outlet for itself. The dam was abandoned, but the structure survived. It is not without interest that a number of dams and irrigation works were constructed about the same time in Yünnan by Saʿīd Adjall, who apparently became governor of Yünnan in A.D. 1274.

The dating of the gravity dams at Ḳuhrūd and Ḳamṣar near Kāshān and at Farīmān and Ṭurūḳ in Khurāsān is uncertain. The Ḳuhrūd dam is attributed to Shāh ʿAbbās and the Ḳamṣar dam to Djalāl Dīn b. Muḥammad Khʷārazm-Shāh. The Gulistān dam in Khurāsān was made by the Tīmūrid Abū Saʿīd Mīrzā (855–72/1452–67). The Salāmī Dam in Khurāsān was constructed by Ghiyāth al-Dīn Kurt (706–25/1306–24). These dams were still in use in the 1960s, but most of them furnished very little water because their reservoirs were heavily silted up.

Under the Ṣafawids, there was renewed activity in dam-building and other constructions for irrigation. Shāh Ṭahmāsp (930–84/1524–76) attempted to divert the water of the Kārūn into the Zāyanda Rūd by a connecting tunnel through the mountain ridge which separates them. The work was abandoned owing, it was said, to the foul atmosphere of the workings. Shāh ʿAbbās I (996–1038/1587–1629) revived the project, but abandoned the idea of a tunnel in favour of an open cutting. It is reported that at times he employed 100,000 men on this undertaking, but the scheme came to naught. Shāh ʿAbbās II (1052–77/1642–67) made another attempt, in which he was advised by a French engineer named Genest. A dam, 300 ft. long and about 100 ft. high was built across the Kārūn to divert the water of the river while the channel was cut. Smith thinks that Genest may have had in mind more than a mere diversion of the river and that he may have hoped to reduce the amount of excavation through the mountains by raising the level of the river. The scheme, however, was also abandoned after 100 ft. of the connecting channel between the two rivers had been cut. The idea was revived during the reign of Riḍā Shāh Pahlawī. Work was begun on the cutting of a tunnel connecting the two rivers. Known as the Kūhrang tunnel, it was finished in 1953. The increase in the flow of water in the Zāyanda Rūd which resulted has enabled more land to be cultivated in the districts through which the river flows. Shāh ʿAbbās II also built, on the foundations of an earlier weir, the Khʷādjū Bridge over the Zāyanda Rūd in Iṣfahān. It is a combination of a weir with sluice gates and flood arches above these, with a permanent roadway on the top.

(ii) *Wells and lifting devices*

A variety of lifting devices operated by men and animals to raise water from rivers, streams and wells have been widely used in the past, especially in Khūzistān,

the Persian Gulf littoral, Fārs, in the neighbourhood of Iṣfahān, in some districts in eastern Persia and on the shores of Lake Urumiyya (Riḍāʾiyya). They are still used, but have been largely superseded by power-operated wells. Man-operated wells consist of a windlass set over the well with a large leather bag attached to it. Those operated by draught animals are worked by one or more animals such as oxen, mules and, less frequently, buffaloes, each animal having one or more men working with it. The constructing of these devices varies slightly in different regions, but the general principle is the same. Their operation is both laborious and inefficient. A wooden wheel is set in two brick or stone built pillars, or two heavy upright posts, above the well, connected by a wooden scaffold. Two pulleys are run on axles attached to the scaffold, over which a main and an auxiliary rope run into the well; the wheel end of the main rope is attached to a hook and a ring carrying a wooden cross from which a large leather bag is suspended. This runs out into a narrow spout to which the auxiliary rope is attached. The draught animal is harnessed to the ropes and sets the wheel in motion by walking up and down a runway beginning at the well-head and descending at an angle of about 20 degrees. By this action, the bag is let into the well. When it is full, it is lifted to the surface and empties itself in front of the well into a trough which carries the water into the irrigation channel. In some wells, a big wooden horizontal cog-wheel, geared to a vertical wheel which turns a bucket-carrying wheel set on the same axle in the water is set in motion by an ox or mule walking round and round a circular runway made about the well.

(iii) *Cisterns, water tanks and ponds*

These are to be found in regions in which water supplies are scarce and are especially common in districts on the edge of the central desert, though they are also to be found elsewhere, notably in Fūmināt. They are supplied by water from *ḳanāt*s, underground springs or rain-water. Some are made with stones or bricks and cement and are often of a considerable size. ʿAbd al-Raḥīm Ḍarrābī states that almost all the villages and hamlets in Kāshān had small cisterns (*istakhr*); that of Niyāsar was 100 *dharʿ* by 50 *dharʿ* and 2/2 *dharʿ* deep. He describes the purpose of an *istakhr* as follows: "In some hamlets (*mazāriʿ*) the water is less than [the amount required for] a plot of land (*kardū*) for the first rotation when water is due to be let into sown land or orchards. As a result, it takes a long time for the plot to be inundated, because when the quantity of water is small, as soon as it enters the land it sinks in and the plot will not be inundated. Accordingly, water is held back in a cistern (*istakhr*). When the latter is full, it is emptied, or whatever amount is needed for the land is let into the irrigation channel until the desired result is achieved. Or it may be that the water of a hamlet is sufficient for the first rotation period but it is desired to lead the water to a piece of land (*dasht*) or fields (*mazāriʿ*) which are distant, and so half or more of the water will be lost in the channel between the mouth of the *ḳanāt* and the land to be irrigated, with the result that the plot will not be inundated (unless a greater head of water is first held back in a cistern). Or it may be that a village has [sufficient water] in the first rotation period for three or four pieces of land, and it wishes to divide the water into three or four irrigation channels, some giving more water and some less. A cistern is therefore necessary, so that the requisite amount can be let into each irrigation channel, or so that water from two or three sources can be let into different channels and then divided (*saridja-paymāʾī namā-yand*)". Ḥamd Allāh

Mustawfī describes how small catchpools were made on the edge of the cultivated area round Tūn to catch rain water which was used for grain cultivation.

Irrigation practices and water distribution and measurements

Irrigation practices range from heavy perennial irrigation, land watered less heavily through the year or parts of the year, to land watered once or twice a season through the capture of flash floods or water stored in a cistern. The usual method of irrigation is by inundation; for some crops, trench irrigation is used. In the case of rivers, the water is diverted into canals and sub-canals and cross-canals, whence it is led into the fields to be irrigated. The division is made according to established rights of priority, usually (but not always) starting upstream and ending downstream. The water of other sources, if it is prolific, is also divided into various channels and led to different users simultaneously. The division of the water between several users is assured by a variety of mechanical devices, distributors, or runnels with inlets of a fixed size or by the allocation of fixed periods of time. Where water is divided by a weir between a number of villages or users, the size of the orifices at the rim of the weir varies according to the share of the water permanently allocated to the different users. Water is led into individual fields, plots or gardens by breaching the banks of the canals (usually with a spade) for the appropriate length of time.

The rotation period of the water (*dawr-i āb*) normally begins in early October with the start of the agricultural year and is fixed at so-and-so many days. Within that period, so many shares, defined in days, hours, or minutes, are allocated to the different districts, villages, fields, or plots of land watered by the source in question. A common way of measuring the unit of time is by a kind of hour-glass, the time-unit being the time it takes for a small copper bowl with a hole at the bottom to fill and sink in another large basin. Stack mentions that in some of the villages of Firaydan, the water distribution was regulated in the daytime by the length of a man's shadow and at night by the stars.

Since the water of rivers is subject to diminution at certain seasons of the year, and in both rivers and *ḳanāts* may be reduced in a series of dry years, much care is exercised over the division and allocation of the water in order to satisfy cropping needs. In the case of *ḳanāt*s, the rotation period may be lengthened in periods of water shortage and the amount of water per share reduced. In general, the scarcer the water, the more detailed and complicated the distribution of water; and the greater the fragmentation of the ownership of the water, the more meticulous and elaborate the organisation of its distribution.

Water laws and water rights

So far as the *sharīʿa* is concerned, water laws belong to *muʿāmalāt* as opposed to *ʿibādāt* and are based on *ʿurf* or custom enshrined in the traditions and given sanction as the practice, or supposed practice, of the Prophet and his companions and their immediate successors and, in the case of the Shīʿa, of the *imām*s. These practices reflect not only the conditions and needs of Arabia at the time of the Prophet, but also those of other regions into which the Muslims later penetrated. They do not, therefore, present a coherent and uniform basis for a body of water laws, but rather a series of unrelated decisions, sometimes in conflict with each other. In general terms, irrigation was governed in theory by the *sharīʿa*, but in practice and in matters of detail local custom prevailed and was extremely varied. In the law books, there are references

to irrigation in the books on *zakāt, ʿushr, khums* and *kharādj, iḥyāʾ al-mawāt* (the revivification of dead lands), *ḥarīm* ("borders"), *mushtarakāt* (things held in common), *bayʿ* (sale), *makāsib* ("earnings"), *ghaṣb* (usurpation), *muzāraʿa* (crop-sharing agreements) and *musāḳāt* (agreements for the sharing of fruit and other trees). The general principles concerning water laws are accepted by both Sunnīs and Shīʿīs, but there are differences in matters of detail between them and between the different law schools which, in view of the fact that water laws are based on custom, is not surprising.

(i) *The right of thirst (shafa)*

By virtue of the *ḥadīth* which states that Muslims are partners in water, fire, and grass, the use of water is considered as common (*mubāḥ*) to all men, but it may be appropriated by "occupation" (*iḥrāz*), e.g. by collecting rain water in a vessel placed outdoors to that end. It cannot, however, be "occupied" until it has ceased to run, i.e. until it is placed in a vessel or watertight well or basin. Water in rivers, *ḳānāt*s, wells and basins which are not watertight is, therefore, considered to be *mubāḥ*, even if the rivers, *ḳanāt*s, wells and basins should be private property. Everyone is entitled to use such water for drinking purposes for himself and for his animals, provided that the animals do not exhaust the whole supply. The sale of the water of privately-owned rivers, *ḳanāt*s, wells and basins (for drinking purposes) is permitted by some jurists, though all appear to consider it better to give such water than to sell it. The right of all men to use water is confined to drinking purposes and does not extend to its use for irrigation.

(ii) *The right to use irrigation water*

According to the Sunnī *fuḳahāʾ*, the water of the great rivers belongs to the Muslims in common and according to the Shīʿī *fuḳahāʾ*, to the *imām*. Their water may be used by anyone for irrigation and power provided its use in this way does not harm the community, and anyone may divert water from the great rivers by means of a canal, unless such diversion is prejudicial to interests already acquired. In the case of the lesser rivers, the water of which is sufficient to irrigate the land along its banks without the construction of dams, anyone may lead off water in a canal to irrigate other land, provided such action is not prejudicial to existing interests. If the water of a river cannot be used for irrigation without the construction of dams, lands higher up have, according to most authorities, Sunnī and Shīʿī, a prior right to those situated lower down. The Ḥanafīs, on the contrary, hold that lands situated lower down the river have a prior right over those situated higher up, while the Mālikīs lay down that land situated higher up has the prior right of irrigation until the water reaches as high as the ankles, but if the land lower down has been developed earlier and there is a danger of its crops being destroyed, it has a prior right over land higher upstream. These various views are reflected in existing practice. As to the amount of water that may be drawn off, the Prophet is said to have allowed a level as high as the ankle, and this tradition is widely followed. Al-Māwardī, whose exposition is concerned with the practice of water management rather than the theory, holds that the amount varies with the nature of the land, the kind crop, the time of sowing, the season and whether the flow of the river is permanent or intermittent.

The right to use water flowing in artificial beds, such as the water of a canal dug by the people of a village, belongs exclusively to the owners of the bed of the canal, and others may not use the water

for irrigation. The manner of use is established by the agreement of the co-owners. The construction of mills and bridges, etc., requires the consent of all the co-owners. If a mill has been legally built on the stream of a third party, the owner of the stream cannot divert the water except with the permission of the owner of the mill. The use of the water of wells and artificial reservoirs belongs exclusively to those who made them, and others may not use their water for irrigation. The use of the water of springs is also the exclusive right of the owner of the land in which the spring lies. The general view of the Shīʿī *fuḳahāʾ* appears to be that *ḳanāt*s, springs and wells situated in private property, or made in dead land with the intention of reclaiming the land, belong to the person or persons who made them and that they can be transmitted by sale and inheritance and can be constituted into *wakf*. There was not, however, unanimity of opinion on this. Some, including Muḥammad b. al-Ḥasan Ṭūsī, maintain that the water of a well, *ḳanāt* or canal does not become the property of whoever dug the well or made the *ḳanāt* or canal, and that such actions only give a right of priority in the use of the water.

Transmission and sale of water rights and water sources

Most jurists permit the transmission of water rights and water sources, so far as they are private property. From this, it follows that water rights often become highly fragmented. The jurists also permit the constitution of water rights and water sources, so far as they are on private property, into *wakf*, Many *ḳanāts* and canals and rights to a share of the use of various sources of water have been so constituted. The Yazd region is particularly illustrative of this practice. From the number of shares into which many of the *ḳanāts* of Yazd were divided, it would seem that their ownership was highly fragmented. Their constitution into *wakf* prevented further fragmentation.

Dead lands

The revivification of dead lands (*iḥyāʾ al-mawāt*) normally involves the irrigation of the land. Thus al-Māwardī states that land to be revivified for cultivation must be irrigated if it is dry, and drained if it is marshy. Revivification confers ownership, and canals dug to bring water to dead lands belong to those who dug them, and wells or *ḳanāts* made in dead lands in order to revivify them belong to those who made them. If irrigated with *ʿushr* water, revivified land paid *ʿushr*, and if reclaimed with *kharādj* water, *kharādj*. Al-Muḥaḳḳiḳ, discussing the conditions for the revivification of dead lands, states that there is no *sharʿī* text governing these and that reference is to be had to custom. If the intention is the cultivation of the land, ownership is established either by *taḥdjīr*, or by bringing water to the land by a water-wheel or some similar method. New canals and *ḳanāts* to bring irrigation water to dead lands are subject to the laws governing *ḥarīm*.

Ḥarīm

The ownership of landed property involves also a right over the land which borders it, where this is necessary for the full enjoyment of the property. So far as irrigation is concerned, this is of vital importance in respect of springs, streams, *ḳanāts* and water channels. Accordingly, "borders" are laid down for such forms of property, within which a third party may not undertake new irrigation works, though some jurists lay down that "borders" can only exist in land to which no one has a prior right. The extent of the "borders" varies according to the nature

of the water source and according to the nature of the soil. Al-Muḥaḳḳiḳ permits 1,000 cubits (*arsh*) for a *ḳanāt* if the soil is soft and 500 cubits if it is firm.

Muzāraʿa and musāḳāt

The first is a crop-sharing agreement and the second an agreement for the exploitation of fruit trees and other trees, under which the two parties each have a share in the proceeds. Agreements of this type were known in pre-Islamic Persia. Under the former, water is traditionally regarded as one of the five elements (the other four being land, draught animals, seed and labour) affecting the proportion in which the crop is divided between the two parties to the agreement, the landlord and the peasant. In theory, one share went to each of the five elements, but in practice there was much variation in the shares going to either party, though the ownership or provision of water always played an important part in the division of the crop in the case of irrigated land. *Musāḳāt* was an agreement made between the owner of a garden and another party, who would undertake to irrigate the trees and who would receive in return a specified share of their fruit. It could also be concluded for trees or plants which did not bear fruit, but the produce of which was capable of exploitation, such as the henna or tea plant. It could also be concluded for newly-planted trees which would not bear fruit for some years. The responsibility for cleaning *ḳanāts* and irrigation channels under a *muzāraʿa* or *musāḳāt* varied according to local custom. The digging of new wells and canals was normally done at the expense of the landowner. These agreements might be written agreements, but were probably often oral agreements based on local custom. They might be for one or more years. In some quarters there appear to have been a prejudice against long-term agreements. Sayyid Rukn al-Dīn Muḥammad b. Niẓām (d. 732/1331–2), who constituted much property—shares in *ḳanāt*s, real estate and landed estates—into *awḳāf* in Yazd, laid down that no *muzāraʿa* or *musāḳāt* should be concluded for more than one year.

Taxation

It is difficult to lay down the connection between the provision of irrigation and taxation, because no general principle prevailed. Probably in most districts, tax was assessed on the land (together with its water), though in the case of land watered by the great rivers and some of the lesser rivers, water dues were paid to the state. Apart from the source from which it comes, water is also divided by the jurists into *ʿushr* water and *kharādj* water, according to whether it is found in *ʿushr* or *kharādj* land. There is, however, some difference of opinion among the jurists over the status of the water of the great rivers and the implications of its status for tax purposes. Land reclaimed with *ʿushr* water paid *ʿushr* and with *kharādj* water, *kharādj*. When in the course of time the distinction between *ʿushr* land and *kharādj* land became blurred, the distinction between *ʿushr* water and *kharādj* water also ceased to be of practical effect. What was crucial in assessing the tax-bearing capacity of the land was not the hypothetical status of the water, but the method by which it was irrigated. Crops irrigated by water carried on the back of a beast or raised by a lifting device paid half-*ʿushr*, while lands watered by river, spring or *ḳanāt* water or rain paid full *ʿushr*. In the later centuries, when tax was often assessed on the crop, not on the area of land, many authorities permitted the deduction of expenses, which included those on irrigation, before the *kharādj* of the government was reckoned.

In some districts, notably Yazd, where the ownership of land and water was often in separate hands, the revenue assessment was based on a calculation of the water supply only. In its simplest form, a certain rate was imposed per unit of water (*ṭāḳ, tasht, djurʿa sabū, saridja*). The rate varied from village to village; reassessments were seldom made, but the incidence of taxation might be increased by the imposition of additional quotas. Wells in some districts in southern Persia in the 19th century paid a wheel tax (*sar čarkhī*). In the case of the reclamation of dead lands, tax concessions related to the nature of the water supply are from time to time recorded. The Īlkhānid Ghāzān Khān (694–703/1295–1304), who attempted to bring about a revival of agricultural prosperity, classified dead lands into three groups according to the labour required on irrigation works, and gave them tax concessions for three years.

Water rights and the religious officials: the settlement of disputes

Water, perhaps because it is closely associated with *ʿushr* and *kharādj*, which are among the *ḥuḳūḳ Allāh*, generally speaking came within the purview of the religious officials. The regulation of the water of the Harī Rūd in the 8th/14th century is said to have been carried out by the Shaykh al-Islām Niẓām Dīn ʿAbd al-Raḥīm Khʷāfī, and that of the Zāyanda Rūd in the 11th/17th century is attributed to Shaykh Bahāʾī (Bahāʾ al-Dīn Muḥammad al-ʿĀmilī) (see below). So far, however, as the religious officials gave decisions and issued *fatwās* for the settlement of disputes over water (which were of frequent occurrence), they relied for the execution of these, as they did in decisions over other matters, on the officials of the government. Thus when ʿAbd Allāh b. Ṭāhir (213–30/828–44) found that there was no body of laws on *ḳanāt*s, he assembled the *fuḳahāʾ* of Khurāsān and ʿIrāḳ (not the *ʿummāl-i ʿurf*) to write a book on laws governing *ḳanāt*s. Similarly, from a letter preserved in the *ʿAṭabat al-kataba*, probably written just before or just after the fall of Sandjar in 552/1157, it would appear that the assessment of water rates (*ḳānūn-i āb*) was the concern of the officials of the religious institution in the person of the local judge (*ḥākim*). An undated letter in the *Dastūr al-kātib* of Muḥammad b. Hindūshāh Nakhdjawānī, which is dedicated to Sulṭān Uways b. Shaykh Ḥasan-i Buzurg (757–77/1356–74), mentions the *fatwās* of the *ʿulamāʾ* concerning the destruction of a dam on the Mihrān Rūd at Tabrīz. This had been built to divert water to a newly-founded village and had resulted in the river-bed becoming silted up so that flooding took place in Tabrīz. The answer to the letter states "Let action be taken in accordance with the *fatwās* of the *imāms* of religion and let these not be transgressed or altered". Whether the letter actually existed or was composed by Muḥammad b. Hindūshāh, it can be taken as a typical example of contemporary practice (as it should be rather than as it was). In some cases, royal *farmāns* were issued for the settlement of water disputes—and not necessarily always those of a major nature. A short *farmān*, dated Dhu 'l-Ḳaʿda 952/Jan.–Feb. 1546 issued by Shāh Ṭahmāsp, regulates a dispute over water rights between Kharāniḳ and Sulṭānābād, two villages in Ādharbāydjān. It orders the peasants and crop-sharers of Kharānik to act towards the peasants of Sulṭānābād in accordance with the *sharṭ-nāmača* concerning their water rights as fixed by Djalāl Dīn Maʿṣūm Beg Ṣafawī, the *mutawallī* of the holy shrine (? of Ardabīl). In this case, it would seem likely that one or both of the villages may have been *wakf*, since

Maʿṣūm Beg, the *mutawallī*, had been called in to regulate their shares, and if they were Ṣafawid *awḳāf*, this would explain why a royal *farmān* was issued to decide a dispute between two small and unimportant villages. In the case of the great rivers, the decision of water disputes was in the hands of *mīrāb*, who was an official of the state and those of the *ʿummāl-i ʿurf* (see below).

The upkeep of rivers

The *mīrāb*. The responsibility for the upkeep of the great rivers was vested in the *imām*. Cleaning or dredging and repair of their banks was carried out by the *imām* and paid for by the public treasury. If there were no funds available for such work, he could compel the Muslims to give their services for the purpose. The cleaning and repair of canals from the great rivers leading water to individual villages was the responsibility of the owners of the canals. If they refused to carry out the necessary work, they could be compelled to undertake it, since neglect of their duty might result in injury to the community and might diminish the supply of water to those who had a right to it. In the provinces, responsibility for the control of the waters of the great rivers was in practice delegated to the provincial governor. With the fragmentation of the caliphate and the rise of local dynasties, this responsibility passed to those who held power locally. There was, therefore, no uniformity of system and information concerning water control and irrigation is patchy. It was presumably the theory that the *imām* had the right to compel the Muslims to give their services for the repair and cleaning of the great rivers which gave sanction to the practice of levying corvées for irrigation works, either of a seasonal nature, as in Sīstān, or of an occasional nature. Thus when ʿIzz al-Dīn Muḳaddam made plans to restore prosperity in Harāt in 653/1237–8 after the depredations of the Mongols, he held a meeting in the Friday mosque and assembled the men of Harāt to work in corvées (*ḥaṯḥar*) on the irrigation channels which had silted up. Some centuries later, Faḍl Allāh b. Rūzbihān Khundjī (d. 927/1521), while still taking the view that expenditure on irrigation works came under the heading of *maṣāliḥ al-muslimīn* and was therefore a legitimate charge on *ḵẖarādj* revenue, nevertheless sought to legitimise the raising of special taxes (*nawāʾib*) for such expenditure. He writes, "What is taken in Khʷārazm from the generality of men for the repair of dams on the Oxus or for the building of walls round the kingdom or other such matters of public interest is a debt which must be paid and a claim which is rightly due, and refusal to pay is not permissible; such taxes are not unjust".

There are from time to time references to special departments in charge of irrigation, but, on the whole, it would seem that their existence was the exception rather than the rule. In western Persia, there appears to have been a *dīwān-i āb* in the 4th/10th century at the time of the rise of the Būyids. The *Tārīḵẖ-i Ḳumm* states that when the Gīlānīs and Daylamīs conquered Ḳumm they abolished the *diwān-i āb*. The only Būyid who appears to have been concerned to foster agricultural prosperity and hence to have paid attention to the upkeep of irrigation works was ʿAḍud al-Dawla (d. 372/982), the builder of the Band-i Amīr. Ibn Miskawayh states that he cleaned canals which were silted up, built mills on them, and mended dams. About the same time, there was in the eastern provinces an extensive water administration for the Murghāb River, which was under the jurisdiction of the rulers of Ghardjistān. A specially appointed *amīr* was in charge of the upkeep of dykes on

the river and the regulation of the water supply. He had 10,000 workmen and horse guards under him. Al-Iṣṭakhrī states that he enjoyed greater respect than the *wālī*. Under Yaʿḳūb b. Layth in Sīstān, there appears to have been a *mīrāb*, who was a government official. Cases against him, in the event of his abusing his power, were heard in the *dīwān-i mazālim*. Under later dynasties, such as the Saldjūḳs, Khʷārazm-Shāhs, Īlkhāns and Tīmūrids, control was, no doubt, exercised over the great rivers by the government, though the sources contain very little information on this subject. So far, however, as agriculture was fostered by individual rulers, this implied some degree of water control.

Information on the division of the Harī Rūd in the 10th/16th century is contained in an essay written by Ḳāsim b. Yūsuf al-Harawī, who wrote the *Irshād al-zirāʿa* in 921/1515–16. He mentions in this essay an earlier division of part of the river made by the Shaykh al-Islām Niẓām Dīn ʿAbd al-Raḥīm Khʷāfī, who had been entrusted with this matter after complaints of alleged inequalities and illicit diversions of the water were made to Muʿizz al-Dīn Ḥusayn b. Ghiyāth al-Dīn Muḥammad Kart (d. 771/1369), the local ruler of Harāt. This division was apparently revised about one hundred years later in the reign of the Tīmūrid Abū Saʿīd Mīrzā, and it seems that it is this revision which was followed by the *mīrābs* when Ḳāsim b. Yūsuf was writing and which he describes in his essay. He gives the regulation of the water in each *bulūk* or district, and the water rights of the villages and gardens watered by the canals of the *bulūk* and the dues of the *mīrāb*. He also records the number of men (*nafar*) to be provided by each *bulūk*, presumably for work on the upkeep of the canals.

Thanks to two late Ṣafawid administrative handbooks and a *tūmār* on the regulation of the water of the Zāyanda Rūd, attributed to Shaykh Bahāʾī (Bahāʾ al-Dīn Muḥammad al-ʿĀmilī), who died in 1031/1622, we know something of the irrigation system of the Zāyanda Rūd and the work of the *mīrāb* in Ṣafawid and post-Ṣafawid times. As in the case of other rivers, the division is based on ancient custom. Traditionally, the water of the Zāyanda Rūd is supposed to have been regulated by Ardashīr b. Bābak and there were also, no doubt, various later divisions. Shaykh Bahāʾī's *tūmār* mentions an earlier allocation of the water. The *tūmār* was in force until 1936, though it is doubtful whether it was in uninterrupted operation from Ṣafawid times onwards. Under the *tūmār*, the water was allocated to the *bulūk*s or districts watered by the river according to a fixed rotation, which varied at different periods of the year, having regard to the cropping needs of each *bulūk*. Within the *bulūk*s, the water was led off in canals to the villages and lands in the *bulūk*, each portion of the village lands having the right to the water for a fixed period of time within the rotation period. The *mīrāb* in charge of the water was an important official, ranking among the higher officials of the bureaucracy and the court. That he enjoyed such pre-eminence was due in part to the fact that Iṣfahān was the capital of the empire and the land watered by the Zāyanda Rūd, or most of it, came under the *khāṣṣa* administration, which was in charge of the *maḥāll*, those districts round Iṣfahān which were directly administered by the central government and in which were to be found also land and water resources which had been constituted into *awḳāf* or which were the private property (*khāliṣa*) of the shah. The duty of this *mīrāb* was to order the peasants, on the eve of the Naw Rūz, to clean the *mādī*s (as the major canals in Iṣfahān were called), lesser canals (*anhār*)

and channels (*ǰadāwil*) which belonged to them, according to established custom. He was to see that the water of the Zāyanda Rūd reached all the districts round Iṣfahān which had a water right (*ḥaḳḳ āba*) in turn and according to the share customarily allocated to them from ancient times. The appointment and dismissal of those in charge of the *mādī*s (*mādīsālār*s) was his responsibility. He was also charged with the decision of disputes and claims concerning the water of the river, though certain disputes of a general nature affecting all the landowners and peasants were referred, according to the royal order, to the *wazīr* of the supreme *dīwān*; in such cases, the *kalāntar, mustawfī* and *wazīr* of Iṣfahān would go with the *mīrāb* and the *wazīr* of the supreme *dīwān* to the districts, examine the *mādī*s, canals, channels and runnels and decide the *ḥaḳḳ āba* of each district on the basis of the *dīwān* registers and settle any claims according to common sense, custom and the practice of former years. In accordance with this practice, many orders and decrees (*arḳām wa aḥkām*) had apparently been issued and had become customary practice. Apart from the customary dues (*rusūm*) which the *mīhrāb* received in each district on account of the first water given to wheat (*ḵẖāk āb*) and the water given to wheat when it was nearly ripe (*dūn āb*), a small amount (*ḳadrī*) was allocated to him by the *ḵẖāṣṣa* administration (*sarkār-i ḵẖāṣṣa-i ṣẖarīfa*) in cash and kind, which he received annually. The accounts of European travellers who visited the Ṣafawid court also show the *mīrāb* to have been an important official. Tavernier states that his office was one of the best offices of the court and much sought after, and he who obtained it was obliged to give large presents. Chardin writes that his emoluments amount to 4,000 *tūmāns* per annum.

Apart from the great rivers, water management was carried out by small-scale local efforts. In the case of the lesser rivers, *ḳanāts* and springs, the administration and control of the water was normally in the hands of the users. They might or might not appoint a *mīrāb*, who might also have assistants whose duty was to supervise the allocation of the water to the users served by the individual canals. In some districts, a *mīrāb* was appointed only when water was abnormally scarce. He and his assistants were paid by dues collected locally or sometimes by a share of the crop.

Irrigation and society

Although it is difficult to generalise on the subject of irrigation in Persia, some few observations can be made on the influence which irrigation has had on society. It was possible through irrigation to introduce new crops and to intensify and diversify agriculture. This agricultural specialisation became the basis of the flourishing civilisations which developed at different periods in the history of Persia. But this process was not uniform over the whole country. Generally speaking, the exploitation of water resources on the plateau would seem to have been more intensive than in the periphery or in regions with a concentration of nomadic or semi-nomadic tribes. The early centuries of Islam were marked by the growth of cities and towns, round which there was, in many cases, an expanding area of irrigated land, the agricultural surplus of which provisioned the cities and towns. The list of the crops grown in the 3rd/9th and 4th/10th centuries given in the work of the Muslim geographers bears witness to a highly-developed agriculture, which depended on irrigation. In the later centuries also, agriculture flourished from time to time, though seldom over the whole of the country at the same time. Periods of expansion alternated with periods of recession, which were the result of natural calamities or political vicissitudes. With the

neglect or destruction of irrigation works, land went out of cultivation and the area under grain crops expanded relative to that under cash crops, as appears to have happened in the early period of Mongol domination. Be that as it may, agriculture up to modern times was the major source of the revenue of the state. It was also the basis of the wealth of the ruling classes and of the livelihood of the majority of the population. The well-being of the state and the people was thus dependent upon a well-maintained irrigation system, and prudence, if nothing else, demanded that attention should be given to the upkeep of irrigation. *Sharʿī* law recognises this, and permits the expenditure of *kharādj* on the upkeep of irrigation works (even if, in practice, funds were often not available, or not made available, and the work was done by corvées). Treatises on the theory of government recognise, in general, that the economic foundation of the state was a flourishing agriculture and that the upkeep of irrigation works was therefore incumbent upon the ruler. The sources do, in fact, frequently mention, in general terms, the efforts of individual rulers and their ministers to spread and foster agriculture, to make *ḳanāts* and to repair irrigation channels; and they also mention the decay and destruction of irrigation works in time of war and insecurity.

This dependence of the state and society upon agriculture and of agricultural prosperity upon an irrigation system which was inherently fragile had certain consequences. In the first place, it produced a certain caution towards experiment and change (whether in the political or the economic field) among those whose income and livelihood depended upon agriculture. The maintenance of irrigation works demanded regular care. This could only be given in conditions of political security. Canals, if not cleaned, silted up and dykes, if not repaired, were breached by flood-water. If the destruction brought by flash floods and storms was not immediately made good, irrigation water decreased. Similarly, without some degree of political security there was no investment in *ḳanāt*s, the digging of which was a highly-skilled operation and the upkeep of which demanded constant attention. There was thus a general tendency to seek security in stable and orderly government backed by coercive force. Secondly, the rotation system of the water, fixed in advance and determined by rules observed by the users, imposed the acceptance of a common discipline. Usurpation and the illicit diversion of water brought strife into the life of the local community and disaster to those who were deprived of their due turn and share of the water. This, too, led to an appreciation of order, and since the responsibility for the distribution of water, except in the case of the great rivers (which were controlled by the state), rested upon the local community, who appointed their own water officials, it fostered the cohesion of local groups and communities and encouraged local particularism.

Drinking water

The right to use water for drinking purposes according to the *Sharīʿa* has been set out above under the right of thirst. The drinking water of villages and towns comes mainly from springs, *ḳanāts* and wells. In the villages, springs are the main source, and from them water is fetched by the users in skins and earthenware waterpots. In the towns, as for example Iṣfahān, many houses had their own wells from which drinking water was drawn. Large houses in many towns had a storage tank (*āb-anbār*), built of fired bricks and lined with water-proofed mortar (*sārūdj*), in the basement and an open tank (*ḥawḍ*) in the courtyard. These were filled whenever the householder's turn to water from the

ḳanāt or other sources came. Their water was used for household purposes but not primarily for drinking. In districts where water was short or brackish, drinking water might be brought from a distance on the backs of animals. Covered cisterns (*āb-anbār*s) are common in towns and villages where water is short, especially on the borders of the central desert. They are also to be found along the roads, sometimes associated with caravansarais. Some have their own springs, but more usually *ḳanāt* water or rain water is stored in them. Domed circular structures, some 50–70 ft. in diameter, reaching 15–20 ft. or more below the surface of the ground, they are a characteristic feature of local architecture.

Many, perhaps most, towns on the plateau, especially as they grew in size, were supplied by *ḳanāt*s. Ḥamd Allāh Mustawfī records that the water of Ḳazwīn was originally from wells. The first *ḳanāt* was made, he states, by Ḥamza b. Ilyasaʿ, who became governor of the town under Maḥmūd b. Sebüktigin. The water of this *ḳanāt* reached most of the quarters of the town. Subsequently, a number of other *ḳanāt*s were made to serve various quarters of the town. Ḥamd Allāh lists eight (all of which were *wakf*) and states that according to the conditions laid down by their founders (*wāḳifān*), their water was to be used for drinking purposes and for *ḥammām*s and was not to be let into gardens or cultivated land. In some places, notably Yazd, *ḳanāts* flow through the houses and the householders have the right to use the water for drinking purposes. Nāṣir-i Khusraw mentions that some of the houses in Arradjān also had a *ḳanāt* running through them.

The provision of drinking water was considered a meritorious action. Many individuals made *ḳanāts* and constituted them into *awḳāf* for the drinking water of a town or one of its quarters. For example, a *waḳfiyya*, dated 941/1534, constitutes part of the water of the river of Astarābād into a *waḳf*. The founder (*wāḳif*) laid down that the water, when it reached the town, should be let into the houses and cisterns (*ḥawḍhā*) and *ḥammām*s and that as soon as one place had taken water, the remainder should be let into the next place, and that in times when water was scarce, no one should use more than was necessary. The founder also stipulated that rice should not be cultivated with the water of the *waḳf*, which was to flow into the town. Many *āb-anbār*s were also constituted into *waḳf* by those who built them. There are also many drinking fountains (*saḳḳā-khāna*) in the bazaars and streets of the towns similarly constituted into *waḳf*.

A shortage of drinking water in many villages and towns, especially in southern Persia, was a common occurrence. Bihbihān, for example, appears to have been short of water in the middle of the 17th century, the people relying on rain-water for two months in winter and spring. In Dihdasht, snow was brought from nearby mountains to supplement the drinking water supply. In modern times, with the increase in urbanisation, water shortages have been a serious problem in many towns. In the middle of the 19th century, Ḥādjdjī Mīrzā Āḳāsī, Muḥammad Shāh's first minister, wished to investigate the possibility of sinking wells with a view to assuring the water supply of Tehran, which was then supplied almost entirely by *ḳanāt*s, but nothing came of this. In recent years, the water supply of Tehran has been supplemented by water stored in reservoirs behind dams on rivers flowing from the mountains to the north of the city.

Drinking water in the towns came under the general supervision of the *muḥtasib*. If water conduits were in a state of disrepair, it was his duty to repair them, or, if there was no money in the public treasury, to

order the townspeople to do so. Similarly, if the source of drinking water was fouled, he could order them to rectify the matter. In modern times, the regulation of the water supply of the towns has been under the municipalities, and in recent years there has been canalisation in most of the towns.

(A.K.S. LAMBTON)

7. IRRIGATION IN NORTH AFRICA AND MUSLIM SPAIN

The present article is limited to a consideration of the supplying of drinking water to the towns and villages, as it appears from the mediaeval texts, in addition to a consideration of the customary rules concerning the ownership, use and repartition of water used for irrigating gardens.

The works of the mediaeval historians and geographers give hardly any information on the system adopted in the rural areas, but for al-Andalus, there exists a rich geoponic literature which has been recently utilized. Irrigation in Spain bears the stamp of the Islamic period and that, in particular, a large part of the relevant technical vocabulary is Arabic or modelled on Arabic expressions, even if the very characteristic irrigation pattern still remaining in the *huerta* of Valencia does not stem from the Arabs.

In regard to the towns and the places of some importance, a geographer like al-Muḳaddasī rarely neglects to mention the source of the local inhabitants' drinking water (*s̲h̲urb*): springs, wells or cisterns in which rain water was collected, and, less frequently, rivers, streams or simple perennial watercourses. Women who did not have either a tank or a private well (equipped with a water-raising apparatus in a more or less developed form) had to have recourse to one of these sources for drinking water, filling there their pitcher, unless some charitable soul had constructed, as a work of piety, a public fountain (*sabīl*) in form of a *waḳf*.

In general, gardens within the urban boundaries were irrigated by means of canals (*sāḳiya*, pl. *sawāḳī*) led off the watercourses or, when there were only wells, by means of simple channels leading from basins filled with water by means of norias [see nāʿūra] or more simple water-raising contrivances. It is surprising that al-Muḳaddasī, usually so meticulous, does not speak about the installations and arrangements at Fās, remarkable as they are. This capital city had indeed not merely a large number of springs, but also a river, the Oued (*wādī*) Fās, where "the Fāsīs have taken off water which they need for driving mills, carrying away their rubbish, filling their fountains and basins, and irrigating their gardens. To achieve this end, they undertook considerable construction works, whose ancient date does not allow us to get an exact idea about them". It is a fact that the town has long had a network of water channels, some above ground and some below, which take the water as far as individual houses, as well as drains crossing the various quarters. Inevitably, disputes often took place between the people of Fās and the country-dwellers on the river banks upstream from the town, since the latter had no right theoretically to take off water. There existed a special legal structure to regulate these conflicts, whilst, for the upkeep of these water channels, special workers (the *ḳwādsiyya*, from *ḳādūs* "pipe", pl. *ḳwādes*) were placed under the authority of an *amīn al-māʾ al-ḥulw* for the drinking water and an *amīn al-māʾ al-muḍāf* for the drains.

Although the town's population had at its disposal an unusual abundance of water, the water brought into the houses was not generally drinkable. Hence at Fās, as in other Moroccan towns, one used to see

going around a picturesque class of water-carriers (*gəṛṛāba*, pl. of *gəṛṛāb*, from *əgrba* < *ḳirba* "water skin"), who attracted attention by their eye-catching appearance, the tinkling of their little bells and the copper vessels in which they handed out drinking water from their dripping water skin to thirsty passers-by without asking the slightest return; in order to make a living, they had a regular clientèle to whose homes they delivered drinking water. The installation of a modern water distribution system had reduced the activities of these *gəṛṛāba*, who have now become largely a tourist attraction.

In Spain, Muslim travellers were able to note the Roman aqueducts which brought water from quite considerable distances, but the Arabs in turn did not fail to construct water channels, in particular to bring water from the sierra to the mosque of Cordova. However, the most original installations, it seems, are in the region of al-Ḳayrawān, in Byzacena (Tunisia), and are attributable not to the Phoenicians or Romans, as has been thought, but to the Arabs, who developed an earlier-existing system by practising, during the four centuries before the Hilālian invasion (mid-5th/11th century), a real policy for water. We have here in one part water channels open to the sky, and in another, reservoirs meant for "storing up streams of running water and, in some cases, water from certain springs and certain underground water-levels". These reservoirs have as a feature two basins, one for decantation, one as a reserve, and sometimes, a third one for drawing water from it.

Water gathered up in this fashion was used extensively for irrigation, which has always been the great care of peasants in regions where the scarcity of rain and of perennial running streams has compelled them to make do with unwatered cultivated lands [see baʿl] and to lavish all their attention on gardens and orchards outside the towns and villages, where, thanks to a more or less thick network of canals and channels, they ended up by making a real oasis.

In general, water is so important in the eyes of the peasant that ownership of it is sometimes independent of that of the soil. Two main ways of acquisition are in effect possible: (a) personal ownership acquired by purchase or inheritance of the piece of land where there is a spring, well, etc., of which the owner can dispose at his own will, subject to his respecting certain rights of use; and (b) collective ownership, in which one part is appropriated to each patch of land which can be irrigated by water belonging to the community. The sale or lease of the estate implicitly includes the disposal of a corresponding part of the water, but the land's owner can also sell or lease out the land whilst reserving to himself a right of usage which he can then dispose of how he likes, compelling the buyer or lessee to obtain by some other means the water which he needs.

The customary law which governs the utilisation of the water has very precise provisions which often go back to the period before the arrival of Islam; indeed, the provisions regarding, in particular, the rights of usage affecting the land owners and the water supply, are clearly similar to those of classical Islamic law, which in fact only confirmed those of the customary regulations.

The division of the individual shares is also subject to strict rules, which nevertheless do not always ensure absolute equality between the participants and which do not sufficiently guard against wastage which might well be avoided. The measuring-out is done in various ways. E.g. a copper vessel with a hole pierced in it may be placed in a tank, etc.

filled with water; when the vessel itself is full and sinks to the bottom of the tank, a stipulated fraction of the time-share in the water is finished. When the water comes from a basin with vertical sides, one may use a rule whose length is equal to the basin's depth and which is graduated, i.e. it bears notches whose spacing corresponds to a given volume of water. Other methods are still in use. When the share of water supply, whose duration and periodicity vary according to the differing regions and, of course, according to the amount of water available, comes to an end, the arrival channel is blocked up with a mere clod of earth, or a rudimentary sluice-valve, under the control of a person responsible, who may be a child.

Given the fact that periods of persistent drought are far from rare and often take on catastrophic proportions when the wells and springs become totally dried up, the people are driven to perform a certain number of ceremonies of a sympathetic magical character in the hope of getting rain. The most widespread, with variations, comprises the making of a kind of doll out of the wooden scoop normally used for ladling water and the parading of it round the villages suffering from drought, whilst pronouncing incantations and sprinkling the doll with water. In Berber regions, the ceremony ends with a prayer in which the name of Allāh is associated with a personnage who may be an ancient god, one of whose names, *təlgẖenža* (and vars.) is patently derived from that of the scoop, *agẖənža*; the doll is also called *taslit unzar*, "the rain's bride", with *anzar* possibly the name of a male fertility god. Numerous other studies have been made of these rites in North Africa in general, in which the mannikin or image carried round the villages bears differing names.

(Ed.)

8. Irrigation in the Ottoman Empire

The Ottomans followed the detailed provisions of the Islamic law according to the Ḥanafī school, as exemplified mainly in the *Kitāb iḥyāʾ al-mawāt* and the *ḥaḳḳ al-šurb*. The basic notion is that water, like wild vegetation and fire, is *mubāḥ*, that is, open to the use of the public at large. Seas, large-size lakes, great rivers, and subterranean waters are considered to belong absolutely to this category. Everyone is free to make use of these waters so long as no harm is entailed for anyone else. In this case, the individuals had to bear all the necessary labour and expense. But usually the state was responsible for large-scale waterworks on the great rivers. For that purpose it was permitted to make use of public revenues except for *ṣadaḳa*. If the state treasury was unable to finance such works, which were considered essential to the public good, the state could appoint a superintendent (*nāẓir*), who was authorised to employ the local population, if necessary by force, to construct them.

Proprietorship was recognised over certain types of waters which were regulated and protected. *Mamlūk* or privately owned waters were distinguished as either *nahr ʿāmm*, in which the waters remaining after use by the owners were free for public use, and *nahr ḫāṣṣ*, where the water was exclusively for the use of the owners. *Šufʿa*, pre-emptive right, is in effect in the second case. The reclamation of waste land was legally recognised for individuals, Muslims or *ḏimmī*s, who might dig out water-channels (*ḫarḳ* or *ǧadwal*) or wells, or who might find a spring or drained flooded land. In the Ḥanafī school, such ownership is established only with the permission of the *imām* or sultan, with the condition that the reclamation process be completed within three years. In the Ottoman Empire possession rights

were recognised to those who reclaimed waste land without permission. Reclamation projects were given prior approval by the sultan by special diplomas called *temlīk-nāmes* which recognised proprietary rights on waste land as well as on running water and springs within the area delimited by the document. A prescribed amount of land, called *ḥarīm*, and surrounding newly-constructed water conduits, springs, or wells, was recognised as the legal property of the owner of the water.

Water in the *kharḳ*s and *ḳanāts* was subject to private ownership, and no one could make use of it without previous permission of the owner. In the case of those waters under joint ownership of a number of partners, none of the partners could open new water channels, construct mills, or change the sequence or direction of water-use without the consent of the other partners. When given, such permission could be revoked at any time. Water was divided between the partners according to the size of their respective land holdings. Partners on the upper reaches of the river were not allowed to dam up the water and thereby cause shortage on the lower reaches. If a dam had to be constructed, water rights were distributed starting at the lower reaches and working upstream from there. The owner of a body of running water had certain rights when it flowed through somebody else's land. The owner of the land was forbidden to obstruct the flow of the water and had to permit the owner of the water to carry out necessary repair work on his land. *Ḥaḳḳ-i̊ shurb*, the right to make use of water at a given interval, could be the subject of inheritance or devise, but could not be either sold, bequeathed, rented, or given away as charity. However, in Ottoman practice we find examples of owners of water, of individuals or of a *wakf* foundation, where the water might be sold for use in irrigation. What the state was concerned about was to prevent speculation in the price of water and to prevent the depriving of those who had *ḥaḳḳ-i̊ shurb* in favour of those paying higher prices.

In addition to the prescription on water use in Islamic law, the Ottomans continued practices and regulations which they found in the conquered lands and enacted new legislation. These concerned the water supply for cities, water distribution, especially in areas with water shortages, and rice growing, which became a major state enterprise involving water use on a large scale. General Ottoman policy regarding water use and water works was determined to a great extent by the Ottoman land tenure system, which left the direct exploitation of agricultural land primarily to the *reʿāyā* farming small units. The state did not participate directly in large-scale water or land reclamation projects or in agricultural production, except for the water supply in the cities and for rice growing. Such projects were usually initiated and carried out in the form of *wakf* endowments by members of the Ottoman house or of the upper echelons of the ruling class. There was no government agency responsible for water projects or regulations for water use. The construction of aqueducts and maintenance of water ways was under the supervision of the *ser-miʿmārān-i khāṣṣa*, head architect in charge of public works. Under his authority, and directly under a *nāẓir* or superintendent, were the *su yoldjulari̊*, technicians in charge of the maintenance of water pipe system in Istanbul.

Rice cultivation as a major irrigation activity

Here one can see how the Ottomans realised large-scale irrigation projects. In rice growing, abundant water supply and maintenance of water courses for constant watering of the rice paddies were crucial,

so that the real object of possession or assignment was not so much the land but rather the use of the water. In the surveys, the possession or assignment of the *kharḳ* > *arḳ* or *nahr*, the channel for irrigation, was granted by the government to individuals as *mulk* or *tīmār*. Often the possession of a *kharḳ* determined who would possess a certain land. Since the water was distributed in limited quantities, the government strictly regulated the amount of rice seed to be planted, and it recorded in the survey books the amount for each *kharḳ*. Many channels for the irrigation of rice paddies, *anhār-i čeltük* (*čeltik*), were named either after the person responsible for their opening or after their possessors. Because of the unusually large consumption of rice, the Ottomans encouraged from the beginning the extension of rice growing, either by establishing direct government control over watercourses, or by granting possession or proprietorship of waste (*mawāt*) lands, particularly in the flooded areas.

Rice-growing was introduced or extended in the lands conquered by subsequent Ottoman sultans. In his efforts to expand state revenues, Meḥemmed II greatly extended rice cultivation in the Balkans and took under the direct control of the central treasury most of the rice-growing lands in Rumeli as well as in Anatolia. Despite his general policy of returning lands seized under his father, Bāyazīd II did not completely relinquish state control over such rice-growing lands.

In extending the area of rice cultivation, which involved primarily the construction of irrigation works, there were two main methods: state enterprise and private initiative. In order to create state rice fields, the government assigned a group of ordinary *reʿāyā* to a permanent status as *khāṣṣa čeltükdji* (*čeltikdji*), labourers of the sultan on the state's rice fields. In the surveys, they are listed also under the names of *kürekdji* or *ortaḳdji*. Once recorded as *čeltükdji* in the surveys, neither these labourers nor their offspring could change their status. They are also included under similar groups which served in the mines, in the salt-beds or as guardians of the mountain passes in return for exemption from certain taxes, principally the *ʿawāriḍ-i dīwāniyya* or extraordinary impositions. In other words, they constituted a labour force under the direct control of the state. In the province of Anatolia alone, one-seventh of the population was included in this tax-exempt category. The condition of a *čeltükdji* was quite onerous, since apart from the hardships borne by him in irrigating and cultivating the rice, he had to surrender half of his production to the state treasury. The seed was supplied by the state and taken back at the time of harvest. State proprietorship of water channels was considered to be the justification for the exploitation of their labour. This organisation seems to have reached its final form in a later period in the Ottoman empire, since in the early records labourers in rice cultivation were often state-owned slaves, the *khāṣṣa ortaḳdji*. In the eastern provinces, forced labour was imposed upon the *reʿāyā* household to work in the rice fields and repair canals for a fixed number of days every year (usually three or four days). This practice, apparently retained from pre-Ottoman times, caused widespread discontent among the *reʿāyā*, free peasants. Upon the complaint of the Christian *reʿāyā* in the province of Trebizond and in other places against such corvées (*salghun*), the Ottomans introduced the system of registered *čeltükdji* or *kürekdji* as described above. In need of labour forces for extended rice fields in the marginal lands, as in Cicilia or in the lowlands of the Aegean or Pamphylian plains, the state also tried to use the labour of tribal

groups by settling them in the vicinity. In any event, some nomadic groups had already been occupied for some time in growing rice in the flooded lands, and sought to retain this profitable source of income for themselves. In Rumeli, some nomadic groups were simply registered as *čeltükd̲ji*. Thus the concern of the state in converting flooded lands into rice-growing fields by preparing irrigation canals gave rise to groups whose status was quite different from that of the rural population of the Ottoman Empire in general.

When the conduits or *k̲harḳ*s of harnessed waters were assigned as *tīmār* to members of the military class, they were entitled to get a tithe of the rice production. But in addition, many of them, imitating the state system, took half of the rice production when they supplied the seed and other expenses for irrigation. Since this widespread practice often caused abuse of the peasant's labour, and shortages in the limited water supply, the state tried to regulate and control this kind of cultivation.

Also, rice cultivation and connected irrigation works were extensively applied in the *mawāt* lands reclaimed by members of the ruling class and *wakf* founders, both large and small. The state, granting absolute proprietary rights, encouraged such land reclamation projects, which mostly involved the discovery and harnessing of water sources. In such cases, the *k̲harḳ*s were made the property of the individual. But all such projects had to be submitted and approved by the sultan, not only in order to comply with the *s̲harʿī* law, but also for such practical considerations as the protection of the *reʿāyā* against exploitation of their labour and of their water sources. The large-scale irrigation projects initiated by the members of the ruling class in the abandoned flooded areas in the Sakarya river valley are particularly interesting in this respect. In one such project, the promoters proposed and asked the approval of the sultan for constructing a dam on the Sakarya river, and to excavate canals 17,000 *d̲hirāʿs* (11.65 km) in length, and estimated that the irrigated land would take 75 *mud* (approx. 38.5 tons) of seed to plant. The labour was expected to be supplied by the free peasants of the area in exchange for a half-share in the harvest, excluding the tithe due to the *tīmār* holders. Cotton and other crops were also expected to be cultivated on the reclaimed land. Apart from the tithe to be paid to the *tīmār* holders, and the profit accruing to the *reʿāyā*, the promoters promised to undertake the expenses of repairing the caravan highway passing through this flooded area and to construct a caravanserai and five fountains. The sultan gave his approval to this project, subject to the willingness of the *reʿāyā* of the area to work on the reclaimed land.

We find numerous examples of such irrigation and land reclamation projects in the Ottoman empire, always made subject to the approval of the sultan, and made conditional on the consent of the local population and *tīmār* holders to cooperate. Such projects, with large potential yields, were almost always proposed and realised as *wakf* endowments. This method was the predominant form of land reclamation and irrigation in the Ottoman Empire. Except for rice cultivation, the state seldom took a direct part in organising such irrigation projects. Such irrigation projects were undertaken more extensively in the period of the rise of the *aʿyān* and the local dynasties in the 18th century. Under the impact of European commercial expansion during the period, they made efforts to put into cultivation previously unused swampy lands.

Regulations on water distribution

In Anatolia and Rumeli, where water supply was generally adequate for agriculture for 9–10 months out of the year, fixed regulations for water distribution as in Iran and in the Fertile Crescent were not-common. In the dry regions of the central and eastern Anatolian plateau, and during the summer months starting from July, certain regulations were worked out for the distribution of available water sources among individuals. Such arrangements, stemming from pre-Ottoman times, were particularly common in the neighbourhood of large towns where numerous orchards and gardens were to be found. According to the observations of modern geographers, in certain parts of Anatolia where traditional methods survived, the organisation of water distribution was dictated by shortages of water both regionally and seasonally, by the extension of irrigated agriculture, or by aggregation of population. As to sharing of spring water between several villages, there was usually no formal regulation, unless recurrent disputes forced the government to intervene as an arbiter and to work out regulations. Such disputes usually appeared as arguments over the use of pasture lands, and it was the *ḳāḍī*'s court which was responsible for settling them in accordance with the *sharʿī* rules, as was the case with all matters involving water distribution. This explains the lack of universally-applied regulations enacted by the government.

As a general policy, the Ottomans avoided imposing regulations on water use, and abolished preexisting taxes and dues on water. In some districts, the Ottomans retained older regulations for distribution of water, for irrigating gardens and fields, and for water supply to the city. In the province of Ḳaramān, where the Ottomans found the most developed system of water distribution for urban areas, a *mīr-āb* or superintendent of water was chosen to supervise the application of these regulations. To distribute water according to the provisions of the *sharīʿa* regarding the *ḥaḳḳ-i šurb*, right in the use of water, and *šufʿa*, or pre-emptive right, was the *mīr-āb*'s responsibility. To ensure complete equity, the *mīr-āb* appointed, with the approval of the community, several *mutawallī*s who oversaw the distribution of the shares. He was also assisted by *šāgird*s who performed the work during the actual irrigation process. The regulations tried to prevent various abuses, such as taking water out of turn by bribing the *mīr-āb* and others, which reflect the acute competition between the users of water during the summer months. Each user of distributed water paid a fixed fee to the *mīr-āb*, who acted as tax-farmer for the government. The function of *mīr-āb*, apparently originally a Persian institution was performed in other parts of Anatolia sometimes under the name of *su aghasi*. Ewliyā Čelebi made the remark that, if it were not for the *su aghasi*, the populace would have murdered one another.

As to the techniques used in harnessing water, the Anatolian peasant usually used the simple method of channelling water from the rivers through *kharḳ*s or *arḳ*s, but the methods of drawing up water by means of animal-powered wheels or *dōlāb*s and small dams were used.

City water systems

The supply of water to the towns was the second main area of concern for the Ottomans. The Ottoman water system in the towns before 857/1453 has not been studied. However, it is known that after the conquest of Istanbul the Ottomans developed quite a sophisticated water system for the city, and applied this system too in other cities in the empire, notably

in Jerusalem and Mecca. In Istanbul, the most complex and best-studied example, we see that the system consisted of collecting in reservoirs or *bend*s (Pers. *band*) the waters from the two hilly areas in the outskirts of the city, namely the Khalḳalı̊ valley and the Belgrad forest, and then bringing this water underground in huge pipes and over aqueducts to high points in the city. Water towers or *su terāzī*s were constructed to keep the water at a high level and water depots, *maṣlaḳ*s and *maḳsam*s, distributed the water in different directions. In order to construct and maintain the system, an extensive organisation grew up under the chief architect or *khāṣṣ miʿmārbaşhı̊* and the superintendent of the water conduit workers or the *su yoldjuları̊ nāẓı̊rı̊*. The construction and maintenance of the water works was financed and organised by *awḳāf*, either of individuals or of sultans. The main water conduits and aqueducts came into being to bring water to the complexes surrounding the great mosques which, as we know, served as the nuclei for the development of the city. The mainstay of this water system was created through efforts under two sultans, Meḥemmed II and Süleymān I. In the winter of 861/1456 Meḥemmed II gave orders "to bring into the city from the countryside an abundance of water through aqueducts". The Byzantine water works, pipes and aqueducts which had been left to fall into ruin during the last centuries of the empire, were re-discovered and used by the Conqueror to create the first Ottoman water system. The rapid increase in the city's population, first under Bāyezīd II and then under Süleymān I, together with the construction of major mosques under these sultans, led to a search for water sources at a greater distance. It was under Süleymān I that the second major water project was carried out, this time collecting mainly the waters of the Kāghı̊dkhāne valley which also had been used for the water supply of Byzantium up until 1204.

Dalman and Wittek show that the main aqueducts or *su-kemeri*s on this line were the work of the architect Sinān, who built them first in 961/1554 and then a second time in 971/1564 after heavy rains had destroyed them. In constructing their water works, the Ottomans made use of the remains of the Byzantine water conduits and aqueducts as well as employing native Greek experts (a certain master called Kiriz Nicola is mentioned by Selānīkī) among the *su yoldjuları̊*. It may be suggested at this point that the Ottomans borrowed from the Roman-Byzantine system some hydrological techniques and, combining them with their own traditions evolved quite a complex organisation to supply water for their huge capital city. Sultan Süleymān's extensive water pipeline brought to the city and to his newly-constructed mosque abundant water, which was distributed to a number of new fountains. The remainder of the water went to the Palaces and gardens of the Sultan and grandees in the city, as well as to the public bath houses. The basic system was expanded upon by succeeding sultans, particularly in connection with newly-constructed mosques. They constructed new reservoirs and water lines, extending those already in existence in the two main areas of Kāghı̊dkhāne and Khalḳalı̊.

Water sources found and brought to the city through government initiative belonged to the *mīrī wakf* or state-controlled endowments and were placed under the control of the relevant *wakf*'s administration, which was also responsible for meeting repair expenses. Fearing lest the water supply specified for the use of imperial mosques, palaces and public fountains be cut short, *mīrī wakf* waters

were not allowed to be used for any other purpose. Constant inspection to ensure their proper use was carried out by the *su yoldjuları̊*, who even had the authority to enter houses for investigation. When a new charitable institution, a mosque, bath or fountain was to be built, its founder was first required to find a water source outside the city. This water was brought to the city by means of a device called *ḳatma*, that is, the adding of newly-discovered water to the main water conduits of the *mīrī wakf*. This *ḳatma* water could be taken from the main conduits only at certain specified points. Upon application, the sultan gave his formal permission for the use of *ḳatma* and recognised ownership rights over this water in a special *firmān*. The *sh*ar*ʿī* principles required that such a procedure be followed. Many wells were dug in order to exploit underground water as a further addition to the city's water supply. Such waters became the property of the individuals who discovered them. Despite the close watch kept over the *mīrī wakf* waters, there were many instances of diverting of water by individuals for private use. The government therefore closed a strip of land adjacent to the water line to new construction and assigned the populace of twelve villages as guardians and repairers of the water lines outside the city. To meet the water needs of the city population, water from the public fountains was distributed in waterbags by *saḳa*s or *saḳḳā*s. The *saḳḳā*s were organised in two corporations, the *arḳa saḳaları̊* or human water-carriers, and the *at saḳaları̊* or horse water-carriers, who were in competition with one another.

In repairing and enlarging the water system of Mecca dating from ʿAbbāsid times, the Ottomans made use of the organisation which they evolved in Istanbul. They sent a team of experts to carry out the construction, and using black slaves and others organised a maintenance crew along the lines of the *su yoldjuları̊* organisation of Istanbul.

(H. İNALCIK)

9. IRRIGATION IN PRE-20TH CENTURY MUSLIM INDIA

Lakes, tanks, wells and artificial canals have supplemented rain water in the subcontinent since ancient times. With the establishment of the Dihlī Sultanate in the beginning of the 7th/13th century, traditional irrigation technology began to undergo a change, owing to the arrival of skilled architects from Central Asia; in particular, the construction of wells with Persian wheels and of large canals provides a clue to the introduction of certain mechanical devices and the progress of civil engineering in India during the 7th/13th and 8th/14th centuries. This section of the article is divided into three parts: the first on lakes and tanks, the second on wells, and the third on artificial canals.

The Turkish conquerors were the first dividers of the water from the land in the districts of innumerable rivers and boundless swamps in Bengal. They built dykes, roads and tanks and, consequent upon it, the reclamation of vast tracts of land was possible in Deltaic Bengal. According to Djūzdjānī, the dykes made the movement of people and cattle possible during the rainy season, while the water flowing through the channels could be diverted to the paddy fields, in case failure of the monsoon caused scarcity.

The first lake built by Sultan Shāms al-Dīn Iltutmish (607–33/1211–36) outside the capital city of Dihlī was called the *Ḥawḍ-i Sulṭānī* (also *Ḥawḍ-i Shamsī*). The mediaeval Indo-Persian writers mention it as a reservoir constructed for supplying drinking water to the city of Dihlī,

but Ibn Baṭṭūṭā's reference to the cultivation of the seasonal fruits and vegetables at its sides during the summer shows that the water was used for irrigation also. Ibn Baṭṭūṭa also informs us that it was two miles long by half that breadth. ʿIṣāmī alludes to the *Čashmā-yi āftāb* ("sun spring", i.e. the famous Sūradj Kūnd near Dihlī) as its source of water. The details furnished by Sultan Fīrūz-Shāh and the compiler of the *Sīrat-i Fīrūz-Shāhī* about its repair contain reference to the original channels that were led off from the river Djamunā to the lake. These channels supplemented the rain water which sufficed for the whole year.

Like Iltutmish, his nobles also evinced keen interest in public utility works. Evidence from contemporary epigraphic sources shows that, during his and his successors' reigns, a number of lakes and tanks were constructed in the provinces. In Palwal (in Haryānā State) a tank was excavated in 608/1211. Another inscription found at Bārī Khātū (in the District of Nāgawr in Radjasthān) mentions the construction of a lake by the officer Masʿūd, son of Aḥmad Khaldjī, in 629/1232. It must have provided relief both to the cultivators and travellers in the torrid climate of the desert.

Little information is available about the excavation of lakes and tanks in Dihlī as well as in provinces during the Khaldjī and the Tughluḳid periods. Sultan ʿAlāʾ al-Dīn Khaldjī is credited with having taken an interest in developing irrigation in his empire for the progress of agriculture. By the time he occupied the throne of Dihlī (695/1296), the *Ḥawḍ-i Shamsī* had silted up and the city had expanded considerably. Therefore, he had the *Ḥawḍ* cleared of silt and its embankments repaired. Moreover, he ordered the construction of a new lake, larger in area than the *Ḥawḍ-i Shamsī*, outside the wall of his new capital of Sīrī (near Dihlī), and this came to be known as the *Ḥawḍ-i khāṣṣ*. Baranī's reference to the *bālā-band-i Sīrī*, contained in his account of the construction of the beautiful buildings by Sultan Fīrūz-Shāh (752–90/1351–88) thereon, tends to suggest that the dam was built with lofty embankments for the storage of rain water in the nearby area. The construction of these royal lakes considerably raised the water level in the area, and thus reduced the depth of the irrigation wells in the area around.

The Tughluḳid period is marked by much improvement in irrigation facilities in the empire. The number of lakes and tanks increased, not only in Dihlī but in the provincial towns also. The contemporary Persian epigraphs mention the construction of lakes in Bihār Sharīf (Bihār State), Gaŕh Mukhtaṣar (Distr. Ghāzīābād, U.P.) and Manglore (Distr. Sahāranpūr, U.P.). An inscription at Nāgawr informs us that the *muḳṭaʿ* (governor), Malik Fīrūz b. Muḥammad, constructed a large lake in Nāgawr and named it *Fīrūz Sāghar* (Hindi *sagar* "sea").

The lakes constructed in Dihlī are important as reflecting the progress being made in civil engineering on the one hand, and the concern of the succeeding sultans in causing to be constructed more beautiful lakes and tanks than those built earlier on the other hand. For instance, Sultan Ghiyāth Dīn Tughluḳ constructed aqueducts over the lake in Tughluḳābād, whose traces can still be seen. References are also found to the lakes built during the reigns of Sultan Muḥammad b. Tughluḳ and Sultan Fīrūz-Shāh. The anonymous author of the official history, *Sīrat-i Fīrūz-Shāhī*, and hagiographies, mention the famous lakes of Dihlī, such as the *Ḥawḍ-i Tughluḳ-Shāh, Ḥawḍ-i Ḳutlugh Khān, Ḥawḍ-i Shahzāda Fatḥ Khān* and *Ḥawḍ-i Shahzāda Mubārak Khān.* In the provinces, the lakes

constructed in Dawlatābād and Ḥiṣār Fīrūza are worth mentioning. Sultan Muḥammad b. Tughluḳ's *Ḥawḍ*, built on a considerable height in the fort of Dawlatābād, can be seen today. In Ḥiṣār Fīrūza, Sultan Fīrūz-Shāh also had a cistern built in 754/1353 on a raised platform. It was originally constructed for supplying water to the ditch excavated around the fort, but after water from the newly-constructed canals became available, its water was used in the gardens and flower beds inside the fort.

In the 9th/15th century, cisterns appear to have been constructed by the rulers of the regional kingdoms that arose in the wake of Tīmūr's invasion of India (800/1398). The construction of fountains in Djawnpūr, Gudjarāt and other cities in the plains led to the construction of cisterns, as their water, flowing through narrow channels from a height, could make the fountains work. Bābur's description of lakes in the Pandjāb also testifies to the fact that old lakes were kept under repair, while new ones were excavated in the new towns. As the *iḳṭāʿs* assigned by the king to nobles in lieu of cash salary and allowances were hereditary, at least in practice during the pre-Mughal times, the assignees constructed tanks in their lands for the extension of cultivation and horticulture.

Later on, the Mughal emperors, and the Dakanī sultans of Bīdar, Golkonḍā, Bidjāpūr and Aḥmadnagar, established reservoirs. Allusions to these reservoirs in contemporary inscriptions provide insights into the skill employed in their construction. The Muḥammad-Nād, a reservoir built at Bidjāpūr in 1165/1751–2 by Afḍal Khān, is a great feat of engineering. Similarly, the huge tank-like well with rooms was built with the money of Tādj Sulṭān, the wife of Sulṭān ʿĀdil Shāh in Bidjāpūr. The Pānī-Maḥall (water-palace) at Nādrūg and the tank of Mā-Ṣāḥibā at Ḥaydarābād are notable exemples.

In the 12th/18th century, the *amīrs* of Sind and the two rulers Ḥaydar ʿAlī and Tīpū Sulṭān of Mysore maintained the traditions of the early rulers. Tīpū Sulṭān took special interest in irrigation questions, building new tanks and repairing old ones. The huge tank built by him in Doradji possesses a huge embankment about 2½ miles long, and at places is 45 feet high. He also rewarded other people who constructed tanks. The *ʿāmil*s (revenue collectors) were entrusted with the responsibility of maintaining the tanks in the kingdom. All these lakes and tanks from mediaeval times existed till the beginning of the 20th century, but with the modern expansion of the towns and cities many of them have been filled in and the land used for residential purposes. In South India, however, they still survive and are used as picnic spots.

As for the construction of wells, they are mentioned in our sources either as *čāh* or *baʾīn* or *bāʾolī*. The *baʾīn* and *bāʾolī* are step-wells, meant for the use of men and animals. Evidence available about the *čāh* is interesting in so far as it reflects on the use of the Persian wheel to lift water from the deep wells in areas around Dihlī during the early Sultanate period, indicating, from its comparative costliness, considerable local prosperity. Only fairly opulent farmers could afford the installation of this water-lifting machine.

Sources from the 8th/14th century refer to the *sāḳiya* and the *čarkh* set up on the wells that were owned both by the state and by the cultivators. Al-ʿUmarī in his *Maṣālik l-abṣār* was informed by an Indian traveller in Arabia, Shaykh Mubārak of Cambay (Gudjarāt), at some time in the beginning of Sultan Muḥammad b. Tughluḳ's reign (725–52/1325–51), that people in and around Dihlī set up

Persian wheels on the wells to water their fields and gardens. The writer refers to the Persian wheels as *sawāḳī*, whereas the contemporary Indo-Persian writers use rather the term *čarkh*. An interesting anecdote related in the *Djawāmiʿ al-kalim* about Shaykh Niẓām al-Dīn Awliyāʾ suggests the presence of the Persian wheel in Dihlī in the preceding century. It tells us that Shaykh Niẓām Dīn once came across a *čarkh* set up on a well. The cultivator who was driving the bullocks for lifting water, exhorted the animals, saying *āge barh, āge barh* ("speed up, speed up") in a melodious tone. The sound produced by the motion of the wheels and the voice of the peasant had such an effect on the Shaykh that he immediately passed into a state of ecstasy.

The anonymous author of the *Sīrat-i Fīrūz-Shāhī* states that *čarkh*s were set on wells around the newly-constructed *Ḥawḍ-i Shahzāda-yi Mubārak-Shāh* outside the capital Fīrūzābād. The *Ḥawḍ* was filled with the water lifted from the wells in the summer when the rain water was exhausted. He further informs us that the income from the lake was endowed by Sultan Fīrūz-Shāh for the benefit of the poor. The work also contains references to the buckets (*dalw*s) made of metal (iron) instead of *kūza* (pitchers or pottery vessels), hanging down the wheel by means of chain of ropes. The Persian term *dūlāb* also occurs in the same passage, signifying the surface wheel which was used to lift water from the *ḥawḍ*. The *dūlāb* was used to lift water from the open surface of tanks or rivers, the pitchers or buckets being fixed on the rim of the wheel, which was revolved by the hand.

Like Indo-Persian writers, Shaykh Zayn, the *ṣadr* or minister of Bābur, mentions, the *čarkh*. In 925/1519 when Bābur crossed the Djhelum river and occupied Bherā (Sargodhā District in Pakistan), he found Persian wheels as a common means of irrigation there. The orchards and the sugar-cane and paddy-fields were irrigated with the water of wells lifted thus. Later on, when he occupied the territories of Lāhawr, Dipālpūr and Sirhind (932/1525–6), he found everywhere the peasants irrigating their fields by means of the Persian wheel, and he describes its structure thus: "They make two circles of ropes long enough to suit the depth of the well, fix strips of wood between them, and on these fasten pitchers. The ropes with the wood and attached pitchers are put over the well-wheel. At one end of the wheel axle, a second wheel is fixed, and close to it another on an upright axle. This last wheel the bullock turns; its teeth catch in the teeth of the second, so that the wheel with the pitchers is turned. A trough is set up where the water empties from the pitchers, and from this the water is conveyed everywhere". Shaykh Zayn says however that in India, other methods of irrigation are used, including the leather bucket (*čaras*) lifted out of water by yoked oxen, whilst *dhekli*, based on the lever system, which is still in use, was most common.

Gradually, use of the Persian wheel seems to have spread everywhere during the Mughal period, but they were especially numerous in the Pandjāb, the most prosperous region. Even an average cultivator there could afford to set up a Persian wheel on his well, which had been built of bricks and plastered with lime, despite the expenditure.

As for the harnessing of rivers for irrigation purposes, the construction of large artificial canals began in the reign of Sultan ʿAlāʾ al-Dīn Khaldjī (695–715/1296–1315) towards the close of the 8th/13th century. Amīr Khusraw refers to a deep and wide canal built by Ghāzī Malik in the territory of Multān when he describes the revolt of the army and people of Multān against the governor Mughaltay. Besides

this, Ghāzī Malik seems to have constructed canals in Multān and Dipālpūr units. Baranī adds that in every territory where Ghāzī Malik served as governor, he constructed canals for the progress of agriculture there.

The credit for constructing a number of canals in the region between the river Sutledj and Dihlī goes to Fīrūz-Shāh. First, the vast arid tract of Haryānā, where only one crop was raised during the rainy season in a year, attracted the royal attention. In 755/1354, he laid down the foundations of the city of Ḥiṣār Fīrūzā (modern Ḥiṣār) and then constructed a double system of canals, the headwaters of which were drawn both from the Sutledj and the Djamunā rivers. The Sutledj canal, named Ūlūgh-Khānī, flowing through Rupar and Sirhind town, met the Djamunā canal called Rādjīwāh near the new city of Ḥiṣār Fīrūzā. Both of them passed via Karnal. At Ḥiṣār Fīrūzā, they discharged their water through a single channel into the ditch around the city. Yaḥyā Sirhindī supplements Shams-i Sirādj ʿAfīf when he informs us that the construction of canals started in 756/1355. Besides the Djamunā and Sutledj canals, he mentions another canal cut from the Sutledj, the waters of which were conducted up to Djhadjhar (a town in Rohtak Distr.), irrigating a vast arid tract of 96 sq. miles. In 757/1356, another canal was excavated from the Ghaggar river. This flowed past the fort of Sirsuli (town) and reached Harni Kherā. The most important canal was the Djamunā canal (later called western Djamunā canal) that was also cut from the Djamunā and conducted to the capital city of Fīrūzābād. Besides, the Salīmā canal (later *Khānpūr ka nālā*) was dug in the Siwālīk hills and the waters of Sirsūlī and Salīmā were diverted into it. It flowed past Shāhābād town (to the south of Ambālā). Like their master, some of Fīrūz Shāh's nobles also appear to have excavated irrigation channels in their *iḳṭāʿ*s, e.g. the *Sīrat-i Fīrūz-Shāhī* informs us that Khān-i Djahān Maḳbūl planted gardens and constructed canals, serais and bazars in his *iḳṭāʿ*.

The Mughal historians furnish information about the repair of the old and the construction of new canals. According to Abu 'l-Faḍl, first Shihāb al-Dīn Aḥmad Khān repaired the Fīrūz-Shāh's Djamunā canal, as it had silted during the early years of Akbar's reign. Later, another officer of Akbar, Nūr al-Dīn Muḥammad Tarkhān, had the same canal repaired a second time. The reign of Shāh Djahān witnessed the digging of new canals in different territories. Shāh Djahān also increased the length of Fīrūz-Shāh's Djamunā canal by reopening it in the hills at Khiḍrābād, and brought its water up to Shāh-Djahānābād (Dihlī). This came to be known both as *Nahr-i bihisht* and the *Nahr-i fayḍ*. Shāh Djahān's noble, Aṣālat Khān, built a dam on the Karnāl stream and made its water flow into a channel so that the land around might be irrigated.

During the same reign, a number of small canals were built in the upper Bārī Dōʾāb (Pandjāb), the best-known of which was the *Shāh-nāhr*. It was brought from the Ravi in the hills near Radjpur. It flowed as far as Lāhawr, covering 84 miles. Two other canals were led off from the same point, one to Paṭhānkot and the other to Batālā. ʿAlī Mardān Khān is also credited with the construction of a canal from the Tavī river for watering his gardens at Sodhrā near Wazīrābād in the upper Račna Dōʾāb which was 30 miles long. The canals were constructed in the regions of Multān and Sind also during the same reign.

In South India as well, the canals seem to have been a common means of irrigation since ancient times. Evidence available suggests that brick embankments were built to protect them from

inundation. But the general practice in the South was that of water-storage. For instance, there were thousands of canals in Baglana cut from the river, and they supplied water to every village and town during the 11th/17th century. Tīpū Sulṭān, however, built a large canal in the tradition of the Muslim rulers of North India. In 1797 he constructed a dam across the Kavari, a few miles west of Sringapatam, with an embankment 70 feet high. This irrigation system survived till the close of the 19th century, when the modern canal system began. The Persian wheel also became obsolete, owing to the introduction of tube-well technology, so that in the Pandjāb and western Uttar Pradesh they have almost disappeared.

(I.H. Siddiqui)

10. Irrigation in Transoxania

The rivers of Inner Asia, extending from Khʷārazm in the west through Transoxania to eastern Turkistān (the later Sinkiang) and northwards to the Semirečye, have all been extensively used for irrigation purposes in the lands along those rivers and in oasis centres, providing a possibility for agriculture in favoured spots which were not too open to attack from the steppe nomads or more northerly forest peoples. Hence, as elsewhere in the Old World, the maintenance of irrigation works, surface canals and *kārīz*s or subterranean channels (these last to be found as far east as the Tarim basin and the fringes of China proper) depended on injections of capital from strong local rulers, on the mass mobilisation of labour for construction and maintenance work, and on vigorous defence policies to protect the settled lands. Such river systems as those of the Oxus, Zarafshān and Syr Darya to the west of the Tien Shan mountains, and those of the Tarim river and its tributaries coming down from the Kun-Lun mountains, to the east of the Tien Shan, must have had irrigation works long antedating the coming of Islam, even where specific information is lacking and their existence can only be inferred from the sparse archaeological investigations in such regions.

Thus ground surveys and the results of aerial photography have enabled scholars like the late S.P. Tolstov to show how irrigation in Khʷārazm depended on a complex system of canals and channels from the lower Syr Darya and extending westwards towards the Caspian.

The irrigation systems of what was the pre-Islamic Iranian region of Sogdia are especially well known from the mediaeval Arabic and Persian geographers and local historians and were the subject of a special monograph by W. Barthold. The river which flowed through the heart of Sogdia, the Nahr al-Ṣughd or Zarafshān, watered an extensive agricultural region in which were located the great cities of Bukhārā and Samarḳand and many significant smaller urban centres; under Islam, the zenith of their prosperity was reached under the local dynasty of the Sāmānids (3rd–4th/9th–10th centuries). The left bank tributaries of the Zarafshān coming down from the Buttamān mountains (in what is now northern Tajikistan and the eastern part of the Kashkadar'inskaya *oblast* of Uzbekistan) were fed by large quantities of melted snow in spring and early summer. There were along them diversionary dams which divided up the river flows and led them into irrigation channels, called from later mediaeval Islamic times onwards by the term used in Turkish *arïḳ/arïġh* (but probably of non-Turkish origin). A dam constructed four *farsakh*s from Samarḳand gave its name to the locality Waraghsar, lit. "head of the dam". The irrigation waters from there

were regulated by an official resident in Samarḳand who had a staff of subordinates responsible for the upkeep of the banks of the channels, etc., whilst the inhabitants of Waraghsar itself were exempt from paying *kharādj* in return for maintenance work on the dam. The largest channels in the region were navigable, but probably for rafts rather than for boats, and timber was floated down along them to Samarḳand. Within the city itself, water was brought into the *shahristān* or inner city along a channel which crossed the defensive ditch formed by excavating material for the walls, hence the channel was carried on an aqueduct into the *shahristān* at the *ra's al-ṭāḳ* "head of the arch". Alongside the channel, the properties were constituted as *awḳāf* for its upkeep, and the local community of Zoroastrians were free of the *djizya* or poll-tax in return for maintaining the channel in good repair.

Such constructions and arrangements in Sogdia were undoubtedly of pre-Islamic origin. An early Arab governor of Khurāsān, Hishām's nominee Asad b. ʿAbd Allāh al-Ḳasrī, in 117/735 tried to deprive the inhabitants of Samarḳand of water by blocking the channel at Waraghsar and diverting it from the city, at a time when Sogdia had thrown off short-lived Arab control and temporarily recovered its independence under the local king Ghūrak, and had now to be reconquered by the Arabs. The dam at Waraghsar was obviously an ancient work. Further information on the irrigation system of Samarḳand, this time in the Ḳarakhānid period, is given by the local historian Abū Ḥafṣ ʿUmar al-Nasafī (early 6th/12th century) in his *Kitāb al-Ḳand fī ta'rīkh Samarḳand*; he enumerates the various *arïḳ*s and gives the total area of irrigated land.

The Arab geographers likewise give detailed information on the situation at Bukhārā, at the western end of the Zarafshān basin, and this can be supplemented by items from the local historian Narshakhī. According to the latter, the main irrigation channel through the city was known as the *rūd-i zar* "golden, or gold-bearing river". Al-Muḳaddasī and Ibn Ḥawḳal describe how locks and sluices along the *arïḳ*s through the city controlled the water flow at times of the river's spate and inundation.

There was a continuously-cultivated strip of agricultural land along the left bank of the Oxus from Āmul to Khʷārazm, with *arïḳ*s led off the main channel of the river, some big enough for boats to sail on, until the extensive network of canals in Khʷārazm itself was reached (see above). Irrigation canals in the Syr Darya basin began in the Farghāna valley, into which the river's most voluminous source, the Nahr Djidghil (probably the modern Naryn), began; then as now, the Farghāna valley was a land of intense cultivation, and the towns there, such as Akhsikath and Khudjand, derived their water supplies from conduits leading off the irrigation canals. Further down the Syr Darya basin, irrigation channels were a feature of such provinces as Shāsh, Īlāḳ and Isfīdjāb until Sawrān and the frontier with the Oghuz steppes were reached.

The Murghāb river in northern Khurāsān (now mainly in Turkmenistan) had numerous canals and dams along its course, controlling the waters which came down from melted snows in the Paropamisus mountains of northern Afghānistān. One should add here that we possess especially valuable information for the very complex irrigation system in the Marw oasis from some of the Arab geographers and from the section on the terminology of the *dīwān al-mā'* in al-Khʷārazmī's concise encyclopaedia of the technical terms of the various sciences, the *Mafātīḥ al-ʿulūm*,

composed in the later Sāmānid period by an author closely connected with the Sāmānid bureaucracy in Bukhārā; part of this last author's information on irrigation terminology deals specifically with conditions at Marw. Ibn Ḥawḳal characterises the *mutawallī or muḳassim al-mā'* at Marw as a high-ranking *amīr* who had under him over 10,000 men, each with a specific task to perform, for keeping the irrigation system in repair. Al-Muḳaddasī mentions that the *amīr*'s staff included guards (*ḥurrās*) to keep watch over the canal banks and 4,000 divers (*ghawwāṣūn*) who watched the channels night and day and had to be ready to turn out for running repairs in all weather conditions; the allocation of water to its various users was determined by a special measure or gauge (*miḳyās*).

For all these hydraulic systems, the devastations of the Mongols must have had an adverse effect, although agriculture gradually revived and the systems were brought back into repair and use. Tīmūr took steps at restoration of the Sogdian irrigation system, especially when he made Samarḳand his capital. Under the succeeding lines of Özbeg Turkish khāns in Transoxania and Khʷārazm, internal prosperity continued to rest substantially on an agriculture supported by centrally-organised irrigation systems. Hence every canal and rural community dependent on it had its *mīrāb*, the official in charge of the construction and upkeep of the dams and channels. Some of these were comparatively humble local functionaries, but the vital importance of the irrigation systems for maintaining the economic health of Khʷārazm, in later times the khānate of Khīwa was ruled by the ʿArabshāhid ruler Abu 'l-Ghāzī Bahādur Khān (*r.* 1054–74/1644–63), who introduced various administrative reforms, including the appointment of four *mīrāb*s as members of his central council of ministers or *ʿamaldār*s. The historian of the dynasty, Shīr Muḥammad Muʾnis (1192–1244/1778–1829), held the hereditary post of *mīrāb*, in succession to his deceased elder brother, until his death, and his *History* shows that he was indeed personally concerned with the practical affairs involved; his nephew and continuator Muḥammad Riḍā Āgāhī, likewise functioned as a *mīrāb*. Some of the highest personages in the state gave personal attention to these matters. Muʾnis describes how the *amīr* ʿAwaḍ Biy Ināḳ in 1216/1802 supervised the dredging of the Khīwanik canal (the term for such operations being *ḳāzū*, apparently from *ḳazmaḳ* "to dig") the actual work being done by corvée labour (*ḥashar, bīgār*); and the Khān himself, Muḥammad Raḥīm, came personally in 1225/1810 for the re-opening of the head of this canal.

(C.E. Bosworth)

2. Fish, Sheep and Goats

Fish

Samak (Ar.) is a substantive with a generic sense (unit. *samaka*, pl. *asmāk, sumūk, simāk*), denoting fish in general, whether of fresh water or of the sea (P. *samak, māhī*, Tkish. *balık*, Tamahaḳḳ *emen*, pl. *imenān, asūlmei*, pl. *isūlmeien*). The term *samak*, which does not figure in the Ḳurʾān, is, in the work of Arab authors, often replaced by one of its two synonyms, *ḥūt* and *nūn* (pl. *nūnān, anwān*) from the Akkadian *nūnu*. However, *ḥūt* (pl. *aḥwāt, ḥītān*, in dialect, *ḥiyūta*) is applied primarily to very large fishes and to cetaceans.

1. Ichthyonomy

It would be impossible here to list all the species which, in systematic ichthyology (*ismākiyya*), number more than a

hundred thousand, and as in almost all other languages, Arabic ichthyonomy is abundant in its scale. Thus, for the Red Sea, the Arabian Gulf and the Indian Ocean, the orientalist G. Oman, of Naples, has assembled, in a recent and remarkable study, close on eleven hundred names of fishes. For his part, Prof. A. Salonen, of Helsinki, has contributed about a thousand names drawn from Sumero-Akkadian. The author of this article, for his part, has gathered, for the western Mediterranean basin (Egypt, Libya and the Maghrib), approximately twelve hundred terms. In this rich terminology, numerous appellations are formed from the nouns *samak* or *ḥūt* or *nūn* combined with a qualificative or a nominal complement. Within the range of the latter, this study will be limited to mentioning only those which evoke a Biblical or historical personage, authentic or legendary, in association with fishes or other aquatic creatures. First to be mentioned in this context is Jonah, Yūnus, known as *Ṣāḥib al-Ḥūt* "the man of the fish" (Ḳurʾān, XXXVII, 142; LXVIII, 48) and, with the same meaning, *Ḏhu 'l-Nūn* (Ḳurʾān, XXI, 87), who is said to have been swallowed by some kind of shark and not by a whale, the latter, with its filters, being capable of absorbing only plankton. Subsequently to be found are the *ḥūt Mūsā* or *samak Mūsā* "the fish of Moses", the *ḥūt Mūsā wa-Yūšaʿ* "the fish of Moses and of Joshua" and the *ḥūt Sūdnā Sulaymān* "the fish of our master Solomon"; these three names are given to the common sole (*Solea vulgaris*). The *sulṭān Ibrāhīm* "the sultan Abraham" is the name given to the red mullet (*Mullus barbatus*). The *Ibn Yaʿḳūb* "the son of Jacob" is the common sargo (*Diplodus sargus*). The *samakat al-Iskandar* "the fish of Alexander the Great" is the hammer-head shark (*Sphyrna zygaena*). With the *ḥūt Sulaymān*, this is not a reference to the person but a phonetic adaptation of the Latin *salmo* for the common salmon (*Salmo salar*). Among the origins of the formation of Arabic names of fishes, the first to be noted are those which are drawn directly from Greco-Roman nomenclature, such as: *baramis*, the bream, from *Abramis brama; usbūr*, the sparid fish, from *Sparus; uṭrūṭ*, the trout, from *Trutta; bulbīs*, the barbel, from *Barbus; balamūda*, the pelamid, from *Pelamys*, also called *būnīt*, the bonito; *tūn, ṭūn, tunn*, the tunny fish, from *Thynnus; tunḳus*, the tench, from *Tinca; anḳalīs*, the eel, from *Anquilla; arrang, ranga, ranka*, the herring, from *Clupea harengus; rāya, raḏja*, the ray, from *Raia; surghūs*, the common sargo, from *Sargus vulgaris*; *sardīn*, the sardine, from *Clupea sardina*; *isfirnī, safarna, safarnāya*, the spet or barracuda, from *Sphyraena; isḳumrī*, the mackerel, from *Scomber; sillawr*, the sheat fish, from *Silurus; salmūn, ṣumūn*, the salmon, from *Salmo; ghādus*, the cod, from *Gadus; luṭṭ*, the burbot, from *Lota lota; lāṭis, lūṭis*, the Nile perch, from *Lates nilotica; lafūt*, the lophot, from *Lophotes; līmanda*, the dab, from *Limanda*. Numerous appellations are also encountered formed from the name of a terrestrial creature joined to the complement—*baḥr* "of the sea", such as: *sabuʿ baḥr* "beast of the sea" for the sea wolf (*Anarhichas lupus*); *faras baḥr* "horse of the sea" for the bellows fish (*Centriscus*); *ḳunfuḏhat baḥr* "hedgehog of the sea" for the sea-urchin (*Diodon*). Similarly, many terms are composed of *abū* "father of…" or *umm* "mother of…", with the complement of a noun marking a characteristic of the fish concerned. The following are examples: *abū ḳarn* "father of the horn" for the unicorn fish (*Naseus unicornis*); *abū miṭraḳa* "father of the hammer" for the hammer-head shark (*Sphyrna zygaena*); *abū sayf* "father of the sword" for the swordfish (*Xiphias gladius*); *abū ṣundūḳ* "father of the chest" for the coffer fish (*Ostracion nasus*); *abū minḳar* "father of the beak" for the

half-beak (*Hemiramphus*); *abū min<u>sh</u>ar* "father of the saw" for the sawfish (*Pristis pristis*); *abū <u>dh</u>aḳan* "father of the beard" for the goat fish or mullet (*Mullus barbatus*); *umm ḳarn* "mother of the horn" for the trigger fish (*Balistes*); *umm al-<u>sh</u>abābīṭ* "mother of the barbels" for the barbel (*Barbus sharpeyi*). Some names derive from living foreign languages, and especially from Spanish, such as *an<u>sh</u>ūyah, an<u>dj</u>ūyah* (Spanish *anchoa*), the anchovy (*Engraulis boelema*); *arrang, ranga, ranka* (Spanish *arenque*), the herring (*Clupea harengus*); *bakūra* (Spanish *albacora*), the albacore (*Germo alalunga*); *durāda* (Spanish *dorado*), the goldfish (*Sparus aurata*). The influence of English, of French and of Italian should also not be disregarded. To the Persian *parastūg* "swallow" are related *barasū<u>dj</u>, barastūk, ṭarastu<u>dj</u>* for the mullet (*Mullus*), and from the Turkish *alabalık* comes the name *alābāl<u>gh</u>ā* for the trout. In a process contrary to these Arabic borrowings of foreign terms, systematic science has sometimes needed recourse to an Arabic term, which is then latinised, to specify a sub-species limited to a particular region. Thus *barda* = the pink sea-bream, is encountered again with *Chrysophrys berda; ḥaffāra* = the wrasse, with *Chrysophrys haffara; sarb* = the grey gilthead, with *Chrysophrys sarba; ba<u>sh</u>īr* = polypterus Bichir, with *Polypterus Bechir; buhār* = the diacope, with *Diacope bohar; bayaḍ, bayyāḍ* = a silurus of the Nile, with *Bagrus bajad; ḥarīd* = the parrot fish, with *Scarus harid; ḥalāwī* = the guitar fish, with *Rhinobatus halavi; durāb* = the chirocentrus, with *Chirocentrus dorab; duḳmaḳ* = a silurus of the Nile, the Euphrates and the Niger, with *Bagrus docmac; <u>gh</u>ubbān* = the green scarus, with *Scarus ghobban; safan* = the sephen skate, with *Raia sephen; say<u>dj</u>ān* = the sidjan scarus, with *Scarus siganus; līmī* = umbra limi, with *Umbra limi; <u>sh</u>alba* = a silurus of the Nile and the Niger, with *Schilbe mystus; ṭahmal* = a silurus, with *Pimelopterus tahmel; urfī* = the braize orphe, with *Pagrus orphus; bunnī Nīl* = the Nile barbel, with *Barbus bynni; lafūt* = the unicorn fish, with *Lophotes cepedianus; limma* = the limma ray, with *Raia lymma; abū ṣanṣūn* = the sansun kingfish, with *Caranx sansun; <u>dj</u>iddāba* = the djeddaba kingfish, with *Caranx djeddaba; balam* = the anchovy, with *Engraulis boelema*.

2. Anatomy

The anatomy of the fish is summarised in few words. The scales are called, according to the regions: *ḥar<u>sh</u>af, fiṣṣ, taflīs, ḳīrāṭ, ḳi<u>sh</u>ra, ba<u>sh</u>īr al-ḥūt* and *a<u>sh</u>kāma* (Spanish: escamosa). For the gills and the bronchiae, organs of respiration, the only words found are: *<u>kh</u>ay<u>sh</u>ūm*, pl. *<u>kh</u>ayā<u>sh</u>īm, <u>kh</u>an<u>sh</u>ū<u>sh</u>a, na<u>kh</u>sh</u>ūsh* pl. *na<u>kh</u>ā<u>sh</u>ī<u>sh</u>*. The cetaceans expel water by means of blowholes or *naysam* pl. *nayāsim*. For the fins the terms are: *<u>dj</u>anāḥ al-samak, zi'nifa, <u>dj</u>āniḥa*. The eggs laid by the fishes (*ṭūmār*) constitute the spawn, *sar' al-samak, sir', sarwa, ṣu'tur*, deposited in spawning-grounds or *masra' al-samak*, habitual sites peculiar to each species; it is there that the fry (*bul'ūṭ*) develop.

3. Halieutics

It is known that, since prehistoric times, fish has always provided one of the principal alimentary resources for riverside and coastal populations, especially of the Mediterranean, the Arabian Gulf and the Indian Ocean. It may thus be stated that fishing (*iṣṭiyād al-samak*) engendered both coastal and oceanic navigation, and this even before the long-range voyages of migration and of commercial traffic. First of all, it is important to distinguish between two very different types of fishing, sea fishing and fresh water fishing, the species of fish belonging to these two aquatic environments not being the same, although some migrate periodically from

one to the other. The halieutic vocabulary for these two modes of fishing is quite abundant. In fishing on the high seas, associated with navigation, the principal instrument used is the large pouched net known as seine or drag-net (*djarf, djārūf, djarrāfa, ḳaṭṭāʿa, baṭāna*) supported by floats of cork (*ʿawwām, ḳurtūdj*) and terminating in a closed end (*khurṭūm*). It is towed by rowing boats and, when reckoned to be full, dragged to the shore. For tunny fishing, especially in Tunisia, the device used is a huge enclosure formed of meshed cloth with which the tunny bed is surrounded; this is the tuna net (*mazraba*). The catch is hoisted aboard the boats by means of gaffs and grapnels (*khaṣm al-ḳādī, mukbulān, miḥdjān, ʿakfā, ʿukḳāfa*) or dispatched directly with harpoons (*khaṭūf, khaṭṭāf, ʿaṭūf, kullāb, mudjīr, muʿīn, mughīth, musahhil*). A third method of fishing at sea consists in stretching out a long cable which is held on the surface by floats and fitted, at regular intervals, with fish-hooks (*sannāra, ṣinnāra, shiṣṣ, mikhtāf, mukh* ü *ṭāf*), baited and slightly submerged; this rope with fish-hooks is known as *balāngar, brungalī, shīrīnbak*. Finally, there is fishing by means of dragging a line fitted with gull-feathers; this is *dūzan bi 'l-rīsha* or *shalūsh*. The fishing-line, made from plaited horsehair, is called *sadjim, shalīf, būlīs*. The bait most often used is the talitrus, a small leaping crustacean, also known as the sand-flea (*Talitrus saltator*) or *kūkra*, in addition to the arenicol (*trīmūlīn*), a small beach worm (*Arenicola marina*).

Once ashore, the fisherman (*khannāḳ, ʿarakī*) delivers his catch to a fishmonger (*sammāḳ, ḥawwāt*) who maintains a shop (*khināḳa*) in the fish-market (*sūḳ al-khannāḳīn*).

Fishing in fresh water, practised in stagnant waters as well in the current of any watercourse and large river, employs diverse techniques. Where the depth allows, the fisherman enters the water directly, wherever he can find a foothold, thereby dispensing with the need for a boat. By this means he can deposit an eel-trap (*salla, radfūn, radfūn, wahhār*) with bait, which needs to be raised only once or twice daily. In the absence of such a trap, he contents himself with digging a channel in the water-bed (*ḳannūra*), in the place which he judges to be the best conduit for the aquatic fauna, and baits it copiously; eels, barbels, breams, carps and many others will soon arrive to feed there. When he sees his channel swarming with fish, he needs only a landing-net (*ghirāfa, ʿabb*) to draw out what he wants; eels are killed by means of a fishgig (*bāla, fāla, ḥarba*). If the catch is particularly abundant, he may place some of the fish in buckets of water, transferring them, as a reserve, to a fish pond (*maḥḳān, djals, ikhādha, faḍla, birka*) prepared for this purpose. In the Maghrib and the Near East, a very popular and lucrative form of fishing, practised in fresh water as well as on the sea-shore, consists in the use of a stick fitted with the small bag-shaped net known as a cast net (*ṭarḥa, ṭarrāḥ, bayyāḥa*) with weights attached to its periphery in such a manner that it sinks to the bed of the water. The caster, who may stand up to waist-deep in the water, draws it slowly towards himself, thus imprisoning the creatures caught in it; everywhere, young fishermen are adept at this activity. Also to be mentioned, finally, is the virtually universal sport of angling with a fishing rod (*ḳaṣba, ḳannāra, ghawayyiṣ*) formed, usually, of numerous sections fastened together and terminating in a fine and very flexible tip (*dhabāb*) to the end of which the thread of the line is fastened, and this bears a floating bob, above the hook. The fishing rod is usually made of pieces of bamboo (*khayzurān*) or other types of wood; modern techniques use metallic or synthetic materials. This

mode of fishing is of two types. The first consists in holding the cane motionless or laying it on the bank, watching for the movement of the float which shows that there has been a "nibble"; it is then necessary to "strike" at once. It is possible to fish with several rods simultaneously, and many amateur anglers come equipped with a bundle (*ṭunn*) of rods. The bait may be an earthworm (*dūda*) or a small fresh water crustacean, the water-beetle *Daphnia pulex* (*burghūth al-mā'*) or a maggot (*du'mūṣ*), or a crumb of bread or some boiled grain such as wheat or barley or hempseed (*shahdānidj, ḳunbuz*) or, finally, a small living fish, i.e. live bait. The second type of rod fishing, very popular with sporting anglers, is "casting" (*rimāya*). The line is wound on a reel (*dūlāb*) fixed to the base of the rod and instead of bait, a small metallic lure (*fitna, khadī'a*) in the shape of an insect or a small fish is attached to the hook. This practice is not widely used in Arab countries, although it is very popular throughout Europe, and elsewhere.

4. Literature

In the literary domain, there is scarcely any treatment of the subject on the part of the ancient Arab authors, the exception being Kushādjim who, in the 4th/10th century, devoted a chapter to fishing in his *Kitāb al-Maṣāyid*. This chapter, brief though it is, is nevertheless valuable on account of the poetic extracts which it includes. It is not until the 8th/14th century that, with Ibn Manglī and his treatise on hunting, *Uns al-malā*, more ample details are obtained regarding fishing with the net, with the harpoon, with chemicals (*dawā'*), with the eel-trap, with clay (*ṭīn*), and with the lantern (*fānūs*) and the pit (*ughwiyya*).

5. Licitness

On account of the predominant place occupied by fish in the diet of Muslim populations, it has been the object of judicial dispositions based on Ḳur'ānic law, in particular the verse (V, 95) "You are permitted the game of the sea (*ṣayd baḥr*) and the food which is found there". Any fish of non-cartilaginous skeleton and devoid of blood may therefore be lawfully consumed, without a requirement for ritual slaughter. However, fish found dead may not be consumed. Also forbidden are: (1) fishes of cartilaginous skeleton, in other words the selachians or squalidae (*ḳirshiyyāt*) including the shark with its various species (*ḳirsh, awwāl, kawsadj, ḳanya, ḳayna, ṭufaylī, ḳuraysh, lakhm, kalb baḥr, bunbuk, liyā', ḳaṣaf, abū minshar*), most of these names supplied by al-Damīrī; the hammer-head (*baḳra, miṭrāḳ baḥr, abū miṭraḳa, samakat al-Iskandar, naḍḍār*), the spotted dogfish (*gharrā'*) and the ray or skate, with its multiplicity of names (*raya, radja, warank, farank, yamāmat baḥr, shifnīn baḥr, tarsa, samak al-turs, daraḳa, samak al-limmā, ḥaṣīra, farsh, ḳuba', ḥalwā, waṭwāṭa, maṣṣūn, maṣṣūla, abū mihmāz*; (2) the marine mammals or cetaceans (*ḥūtiyyāt*) including the whale (*wāla, bāla, ballīna, banīna, būlīna, ḥūt Yūnus*), the humpbacked whale (*ḳuba', djamal baḥr*), the sperm-whale (*'anbar*), the porpoise (*khinzīr baḥr, bunbuk*), the dolphin (*dulfīn, danfīl, danfīr, darfīl, dukhas*), the narwhal (*karkaddan baḥr, ḥarīsh baḥr*), the finback (*hirkūl, manāra*), the orc or grampus (*urka, ḳattal*) and the white whale (*ḥafshrūsī, kalb baḥr*); (3) the amphibian mammals (*ḳawāzib, barmā'iyyūn*) or pinnipeds (*zi'nufiyyāt al-aḳdām*) including the seal (*shaykh baḥr, 'idj baḥr, fuḳma, fuḳḳama, bū mnīr*), the monk seal (*al-shaykh al-yahūdī, abū marīna*), the walrus (*fīl baḥr, fazz*), the sea lion (*dubb baḥr, asad baḥr, baḳrat baḥr*) and the elephant seal (*fīl baḥr*); and (4) the sirenian mammals or "sea cows" (*khaylāniyyāt, banāt al-mā'*) including the manatee (*kharūf baḥr, umm zubayba*) and the dugong (*aṭūm, maliṣa, nāḳa baḥr, zālikha, ḥanfā'*). As for *Rhytina stelleri*, the sea cow (*baḳarat baḥr*) of the Red Sea, it has been extinct for two

centuries. All of these aquatic creatures have nevertheless always been hunted, either for their abundant stocks of fat, useful for many purposes and in particular for the making of soap and the fuelling of lamps, or for their thick and very resistant hide, used in the manufacture of shields and, in particular, of protective shoes for the feet of camels required to traverse stony deserts.

6. As a source of diet

Fish has been a staple source of nourishment for humanity from the outset. It is consumed in various forms. Firstly, it may be fried immediately after catching. On the other hand, it is the object of four principal modes of preservation. The first, much used in Egypt since the time of the Pharaohs, is dessication by exposure to the sun of large and small fish (*mu<u>sh</u>amma', ṣaraṣ, bu<u>sh</u>ūṭa, kūri<u>dj</u>*) such as the stockfish (*bāḳālāw, bāḳālyū, baḳala, baḳlāwa*, from the Spanish *bacallao*). The next is salting and smoking (*tamlīḥ* and *tad<u>kh</u>īn*) for small fishes (*ṣayr*) such as the anchovy (*an<u>sh</u>ūwa, an<u>sh</u>ūyah, an<u>dj</u>ūyah, an<u>sh</u>ūba, <u>sh</u>ūḥa, <u>sh</u>uṭūn, fasī<u>kh</u>, mulūḥa, maṭūṭ*) and the sand-smelt (*ḳu<u>sh</u>ḳu<u>sh</u>, balam, haff*); the same treatment is used for the salmon (*salāmūn, <u>sh</u>alāmūn, ṣūmūn, ḥūt Sulaymān*). Also used is pickling or maceration with spices in brine (*salāmūra, sanamūra*). In Tunis this is the method used to preserve carp (*bunn*). Finally, there remains preservation in oil or vinegar and packing in metal containers; this applies to the sardine (*sardin, sarda, bisāriya, absāriya, 'aram*), the cod, the mackerel and the herring. Delicacies such as caviar (*<u>kh</u>ibyāra*) and botargo (*baṭra<u>kh</u>*), are not widely consumed in Arab countries.

As for culinary preparations of fish, they are most varied and many are similar to those of Europe. Well-known, among others, is the fish stew (*munazzalat al-samak, muḳbulā*) based on eel or carp. The ancient Arabic treatises on culinary art supply five recipes for fresh fish, five for salted, and three with the trigle or gurnard (*ṭirrī<u>kh</u>*).

7. Fabulous marine creatures

Arab authors naturalists and geographers, such as Ḳazwīnī, al-Damīrī and al-<u>Dj</u>āḥiẓ, include in their descriptions of different seas the accounts of seafarers who encountered there enormous marine creatures, unidentifiable and very dangerous. Thus they mention the *fāṭūs* or *ḥūt al-ḥayḍ* which shatters the ships which it encounters, but which is put to flight when the sailors hang from the peripheral points of the vessel rags stained with menstrual blood (*ḥayḍ*). Also mentioned, in the Sea of China (*baḥr al-Ṣīn*), is a fish three hundred cubits in length which the inhabitants of the island of Wāḳwāḳ (Indonesian Archipelago) repel and banish by making the loudest possible noise, beating cauldrons and tomtoms. In the same sea lurks the *aṭam*, which has the head of a pig, is covered with a hairy fleece instead of scales, and shows female sexual organs; it is allegedly edible. In the Indian Ocean (*baḥr al-Hind*) there is a large fish nicknamed *kataba 'l-kitāb* "he has written the book", the juice of which produces an invisible ink legible only at night, and another large green fish with a serpent's head whose flesh, tasted only once, suppresses all appetite for several days.

8. Specific qualities

These are numerous and for the most part beneficial. The flesh of the fish is of cold and humid texture. The best flesh is that of the sea fish, and more specifically, that of fishes with speckled back and delicate scales; but it causes thirst and may generate catarrh; it is appropriate for those with high temperatures and for young persons. It is necessary, however, to reject black or yellow fish, those of marshes which absorb mud, and in particular the bream (*abrāmīs*) and the

grey mullet (*būrī*), which cause gastric disorders sometimes involving serious complications. On the other hand, Avicenna maintains that the flesh of the fish is, with honey, beneficial for the treatment of cataracts and for increasing visual acuity. According to Ḳazwīnī, this flesh is supposedly an aphrodisiac when consumed with fresh onions. An intoxicated person, exposed to the smell of fish, soon becomes sober and regains lucidity. The gall of fish in the form of eye-wash is a cure for watering eyes and, mixed with that of the marine turtle, it provides a golden phosphorescent ink.

(F. Viré)

Small livestock

Ghanam (Ar.), a femine singular noun with the value of a collective (with the plurals *aghnām, ghunūm* and *aghānīm*), designates the class of small livestock with a predominance, according to the countries, of either sheep (*shāʾ al-ḍaʾn, shiyāh al-ḍaʾn, ḍāʾina*), or goats (*shiyāh al-maʿz, māʿiza*). Like the two other collectives *ibil* "camelidae" and *khayl* "equidae", *ghanam* defines one of the three aspects of nomadic pastoral life covered by the term *badw* as well as an important activity of the sedentary agriculturalist countryfolk, who may be periodic migrants; small livestock constitute for the one group a direct and unique source of subsistence (*ḳanī al-ghanam*) with the milk, fleece, hide and rarely the meat and, for the others, an extra product negotiable in the fairs through the intermediary of the sheep merchant (*djallāb*).

The root *gh-n-m* implies the acquisition of goods by means other than those of barter and purchase; the synonyms *ghunm* and *ghanīma* "booty, war trophy" set in relief this idea, excluding from it any allusion to the means of illegal and immoral appropriation. Also, *ghanam* (dialect. *ghnem/ghlem*) is understood in the sense of "sheep-goat patrimony" (see Ḳurʾān, VI, 146/147, XX, 19/18, XXI, 78) completing with *baḳar* "cattle" the full meaning of *naʿam* "livestock" (pl. *anʿām*, used 32 times in the Ḳurʾān). In Arabic, it is the equivalent of the Latin nouns *peculium* and *pecunia*, derived from *pecus* "herd". Parallel with *ghanam* and with the same meaning, one finds, especially in the Maghrib, the terms *māl* and *kasb/kisb* ʿ whence the dialectal *ksība/ksīb* "flock of sheep" (cf. Berber *ulli*, from the radical *l* "to possess").

Although the Ḳurʾānic verse (VI, al-Anʿām, 144/143) saying: "[Allah has provided you] with eight species of animals in pairs, two for the sheep and two for the goats…" does not make any discrimination between the two species, a long polemic between intellectuals reported by al-Djāḥiẓ brought into opposition the partisans of the sheep and those of the goat. However, this sheep-goat duality was not new, since echoes of it are found in the two monotheistic religions prior to Islam. In fact, to the degradation of the goats, the Jews had their rite of the "scapegoat" at the time of their Festival of Atonement, while Christian demonology saw in this animal an incarnation of the devil. By contrast, sheep enjoyed the favour of the two communities, as they were favourites of God; there is the ram of Abraham, the paschal lamb, the symbol of the mystical lamb applied to Christ and the parable of the "good shepherd" wisely leading his "sheep" (Vulgar Latin *ovicula*, from *ovis*). The Arabs, long before Islam, used to sacrifice a ewe (*ʿatīra*) to their divinities, in the month of Radjab, whence its name of *radjabiyya*, by way of prayer and as an act of thanksgiving; while in the Maghrib and Tunisia in particular, the cult of the ram was widespread, reminiscent of the

Egyptian cult of Ammon Ra, and it was only definitively abolished by the energetic repressions of the Aghlabid *amīr*s, in the 3rd/9th century. In veneration for Abraham, Islam preserves the rite of the sacrifice of the sheep on the 10th of the month of Dhu 'l-Ḥidjdja, the day of the pilgrimage, culminating at Minā called *yawm al-naḥr* "day of slaughter"; for all the Muslim countries it is the "feast of the sacrificial victims" (*ʿīd al-aḍḥā*) or "feast of the offerings" (*ʿīd al-ḳurbān*) and, in the Maghrib, "the great feast" (*al-ʿīd al-kabīr*). Engaging in historico-religious arguments, the apologist for the sheep would point out the superiority of the former over the goat on account of its wool, its milk and its flesh; furthermore, in grazing, the sheep does not have the "acid tooth" of the goat which uproots the plants, damages the bushes by devouring the buds and breaks down buildings by its need to climb over everything, whence the proverb *al-miʿzā tubhī wa-lā tubnī* "the goat destroys and does not build". Finally, the sheep with his thick fleece and covering tail decently conceals his posterior, whereas the stump of tail of the goats, shamelessly raised, is a defiance to modesty, not to mention the goatish odour which makes the company of the *tayyās* "goat-herd" shunned. Linguistically, to call someone a *tays* (pl. *tuyūs*, dialect. *tīs*) was a great insult and, notably, in the expression *mā huwa illā tays fī saḏīna* "he is only a goat in a boat", alluding to the nauseous and persistent smell which the animal leaves wherever it has stayed. On the contrary, the nickname *kabsh* "ram" was eulogistic and flattering, especially in the metaphor *huwa kabsh min al-kibāsh* "he is a chief ram", synonymous with *huwa faḥl min al-fuḥūl* "he is a chief stallion", i.e. "he is a champion". Against these notions is the defender of the goats *ṣāḥib al-māʿiz*, in whom one should see, at the time, either the Ḥidjāzī or the Yemenī, their respective homelands being particularly abundant in goats; for such a person, the goat outclasses the sheep as much by the varied products which it supplies as by its vitality and resistance. In the society of goat-herds one would say of an energetic man: *huwa māʿiz min al-riḏjāl* "he is a goat among men", whereas one would snub the incapable weakling with *mā huwa illā naʿḏja min al-niʿāḏj* "he is only one of the ewes". Apart from the important place occupied by goats' hair, as smooth (*sabad*) as flock (*mirʿizz*), the equal of wool (*labad*, *ṣūf*) among weavers, goats' hide was and still is the principal material for containers, bags, straps, shoes, cloths and covers; although camel-breeders, the tribesmen of Muḍar remained faithful to their red tents of goats' hide.

In fact, this polemic, puerile as it may appear, was not solely literary, for it was the reflection of an old antagonism dividing the tribes according to the kinds of husbandry that they practised; a series of more or less authentic Prophetic traditions testifies to this antagonism between breeders and one of the most typical says "Pride (*fakhr*) is characteristic of the owners of horses, brutal roughness (*ḏjafāʾ*) of the owners of camels, and serenity (*sakīna*) of the owners of small livestock". Among the great nomadic camel-breeders scorn for the small nomadic sheep-breeders was expressed by degrading proverbs such as *al-ʿunūḳ baʿd al-nūḳ* "the she-goats after the she-camels", stigmatising the misfortune of a group forced by poverty to give up camels for small livestock, for, to them, this meant really a descent, since *al-ẓilf lā yurā maʿ al-khuff* "the cloven hoof [of the small livestock] is not seen alongside the hoof [of the camel]". All these tribal oppositions arising from the kinds of husbandry were to vanish with Islam, for the position of the Prophet in favour of small livestock was very clear; having been a

shepherd himself, he was pleased to say "Among all things, small livestock is an invitation to modesty and an incitement to choose poverty, leaving aside grandeur and pomp; prophets and just men were pastors of small livestock". In his eyes, the sheep-goat association was for man a divine gift and he used to say, moreover, "I recommend you to have the greatest care for sheep, clean their mucus (*rughām*) and clear their enclosure of every thorn and stone, for these animals are also to be found in Paradise", advising the shepherd to perform his prayers near the fold. Small livestock also provide him with a metaphor to express his aspirations for the Islamisation of the conquered regions by encouraging the crossing of beasts with a black fleece (= the Persians) with those with a white fleece (= the Arabs, of superior race).

In the linguistic domain, sheep and goats were defined by a considerable number of terms which the great Arab philologists of the 2nd/8th and 3rd/9th centuries attempted to gather together in specialised works, of which very few have been preserved for us. One of the first seems to be al-Naḍr b. Shumayl (d. 203/818) with his *Kitāb al-Ghanam*, the fourth volume of his huge encyclopaedia of Bedouin life, the *Kitāb al-Ṣifāt*. At a later date there are a *Kitāb Naʿt al-ghanam* and a *Kitāb al-Ibil wa 'l-shāʾ* of Abū Zayd al-Anṣārī (d. 214/829), a *Kitāb al-Ghanam* ascribed to al-Akhfash al-Awsaṭ (d. *ca.* 215/830 or 221/835), the *Kitāb al-Shāʾ* of al-Aṣmaʿī (d. 213/828) and, finally, a *Kitāb al-Ghanam wa nuʿūtihā* of Abū ʿUbayd al-Ḳāsim b. Sallām (d. 224/838). Ibn Sīduh gives an idea of the extent of ancient terminology concerning goats and sheep in his *Mukhaṣṣaṣ* in the chapter *kitāb al-ghanam*, consisting of about forty pages. To this ancient base must be added the other mass of material contained in the different Arab and Berber dialects, from ʿIrāḳ as far as the Atlantic Ocean, of the tribes devoted to the husbandry of small livestock. The scanning of several lexicons dedicated to these dialects, such as that of G. Boris for South Tunisian (*Parler arabe des Marazig*, Paris 1958) or that of Cl. Denizeau (*Parlers arabes de Syrie, Liban et Palestine*, Paris 1960) allows the evaluation of a minimum of two hundred terms, the elementary word-store which each tribal group uses in the exercise of its pastoral activity; this approximate figure still remains well below the reality for some sections. Such an abundance of vocabulary sets in relief the vital character which the husbandry of sheep and goats presents for a mass of Muslim populations, sedentary as well as nomadic; this linguistic richness is not specifically that of the Arabic language, but is to be found among Turkish-speaking shepherds as well as Persian-speaking ones and Berber speakers.

In spite of this plethora of terminology, it remains hard to define precisely the many strains of sheep and goats belonging to the Arabs and other Islamised peoples, just as in the West the zoötechnicians have had some difficulty in unravelling the skeins of the domestic strains of the sheep (*Ovis aries*), undoubtedly descended from an oriental wild sheep (*Ovis ammon*), as well as those of the goat (*Capra hircus*), possibly a descendant of the Aegagrus or Pasang (*Capra ibex aegagrus*), as these two species are naturally polymorphs. Among the sheep one can distinguish, according to the language and in a very general manner, the strains with a large fatty tail (*alya*) or Barbary sheep (= from Barbary or the Maghrib), those with a long, non-fatty tail, those with long hoofs peculiar to India and Guinea and from which derive the strains of Northern Europe and, finally, those of Spain with the "merinos" introduced from the Maghrib under the dynasty

of the Marīnids whose Hispanicised name it has kept. All these strains are subdivided, according to the desired aim of their breeding, into wool sheep and dairy sheep; the sheep kept for its meat, despite the absolute legality of the consumption of its flesh, has not attained in the lands of Islam the importance that it has attained in feeding Western Christendom.

On the subject of zoological strains, the Arab authors and al-Djāḥiẓ in particular, speak only of a few, especially in Arabia, the most widespread being distinguished by some typical anatomical anomaly such as dwarfishness. Also among the species with a very foreshortened shape there is the *ḥadhaf* "the docked one" of the Ḥidjāz and Yemen with a black fleece and almost without a tail and ears; similar was the *ḳahd*, but with a russet-coloured fleece. Baḥrayn had the *naḳad* "puny beast", a stunted sheep, but a good wool producer, whose small size gave rise to the image *adhall min al-naḳad* "slighter than the dwarf sheep". In Yemen the *ḥaballaḳ* is still bred, itself a dwarf, and the *ṭimṭim* with shorn ears and with a woolly dewlap under the throat; whereas the *sādjisī* was large and its wool of a pure white, while the *djalam* of Ṭāʾif, very high on its hooves, had a fleece so smooth that it appeared bald; it was of African origin. Among the strains with a fatty caudal wen, apart from the Barbary sheep (dial. *mazmūzī*), the "Caracul" of Central Asia cannot be omitted, with its long wavy black fleece whose lambs were frequently sacrified for their precious coat called ("breitschwanz" or "astrakhan").

As for the goats, it can be maintained that the majority of the strains of Arabia and the Near East were of African origin. The *nūbiyya* "Nubian" and the *ḥabashiyya* "Abyssinian" goat were distinguished from each other, both large with broad, hanging ears and a short fleece. Quite similar was the *ḥaḍaniyya* (from Mount Ḥaḍan) in Nadjd and whose hair was black or deep red. The *shāmiyya* "Syrian" strain was long-haired, being related to the strains of Asia whose most renowned representative across the centuries remains the "angora" (*anḳarī*) from the name of the great Turkish commercial centre where its "flock" (*mirʿizz, mirʿizzā, mirʿizzāʾ*) was woven (*thawb mumarʿaz*) and exported, but which came, in fact, from the herds of Armenia and the Causacus of Tibetan stock. The success which the textile "mohair" (an Arabo-English term derived from *mukhayyar* "chosen" with the complement of "hair") still has on the world market and the different "camelots" (diapered, waved, moiré and watered) testifies to the high quality of the goat fleeces and confers on them an equal rank in value to that of the best sheep's wools. It is the same with the goats of Kashmir and Tibet, whose silky down covered with long gander is collected daily by carding and woven and gives the shawls of India their renown.

Among the pastoral peoples, nomadic and sedentary, the methods of husbandry of each species have hardly varied since antiquity, having attained by experience a degree of adaptation which would be hard to improve upon. For the former, the rhythm of the seasons unfolds in a permanent quest for even only slightly green pastures (*marāʿī*) and unpolluted watering places, in the steppes bordering the great deserts, for access to the luxuriant, jealously-guarded oases is forbidden to them just as that to the private *ḥimā* was forbidden to them in pre-Islamic times. In Africa as well as in the East and in Asia, these movements are apparently organised, i.e. codified, according to ancestral agreements in the manner of customary right based on group precedence; there is no need to dwell on the interminable conflicts which these questions of pasturage can lead to, especially in the period of drought. At the

beginnings of the agricultural zones and after the cereal harvests, contracts of location of pasture (*sarḥa*) on the stubble and fallow can be concluded between cultivating owners and wandering or migratory shepherds (*ʿuzzāb*). The encampment or *dawār* "circle of tents" is placed as near as possible to a well, a spring or a pool offering the watering place (*mawrid*) indispensable for the animals. The circular area delimited by the tents (*murāḥ*), whose enclosure is completed by a barrier of thorny brushwood, assures the flock of a relative nocturnal security reinforced by the vigilance of these half-wild dogs called with precision "camp dogs". The twice-daily milking takes place after the separation of the unweaned young, before the morning departure of the flock for pasturage and in the evening on its return from the watering place; in the East it is mostly the men who perform it, whereas in the Maghrib it is one of the numerous women's chores. The fresh milk (*ḥalīb*) is immediately churned by swinging in the goatskin container (*shakwa*) hung on posts; there is derived from it, on the one hand, buttermilk (*laban*) consumed immediately either as a drink or as a food or put to curdle with the rennet (*infaḥa*) to make a mild cheese (*djubn*) whose residual whey (*mā' al-djubn*) is given to the lambs and kids or incorporated in culinary preparations. On the other hand, the fresh butter (*zubda*), unwashed and separated from the buttermilk, is immediately put in the goatskin, sometimes salted, to obtain, after it has become rancid, preserved butter (*samn*), a substance based on the fat and used in all foods. To consume the fresh milk and the butter as it comes from the churn would be, in the eyes of the Bedouin, an unthinkable waste in view of the three or four sub-products present in the milk; hence comes the interest shown in the goatskin churn and its contents in this dialectal metaphor from the Maghrib *yeddoh fī sh-shekwa idhā mā djbed el-lben yedjbed ez-zebda*! "He has his hand in the churn; if he does not draw out buttermilk, he will draw out butter!" to describe someone who has found a situation which is very lucrative and not very tiring, and parallel to the French image "avoir trouvé un bon fromage" (cf. American English "He became a big cheese").

Apart from the two daily necessities of the watering and the milking, the shepherd's year numbers several major activities for the life and survival of men and beasts. First, at the beginning of winter, there is the shearing (*djazza*) of the wool-bearers and the shearer (*djazzāz*) has to know how to manage the shears (*djalam*) with dexterity and rapidity on the animal, while it is held on the ground; the mass of wool obtained (*djazīza*) will serve as exchange currency in the oases for utensils and durable foodstuffs (dates, sugar, flour etc.). Another crucial period and, perhaps, the most harrassing for those responsible for the flock who have to stay awake day and night, is that of the parturition (*nitādj*) of the pregnant females with all the care demanded by mothers and newborn, lambs and kids being confused at the beginning under the names *sakhla* (pl. *sakhl*, *sikhāl*, *sukhlān*) and *bahma* (pl. *baham*, *bihām*). The latter, as they grow, take on different names whose system of nomenclature will not be treated exhaustively here, as it varies from one region to another. If a birth threatens to be difficult and may endanger the life of the female in labour and that of the young, there is no hesitation in practising a Caesarian section and the offspring saved is called *ḥullān*, *ḥullām*. In ancient terminology, the distinction between lamb and kid only appeared clearly at the age of weaning (*fiṭām*) around four or five months. Until then, the young lamb-kid (*badhadj*, *farīr*,

furār, furfur), is left to its mother, but when it is over three months, the teats are progressively taken from it, ending by their being forbidden it, the maternal mammaries being enclosed in a bag (*shamla, shumāl*), which may be made of a hedgehog skin; a gag (*faṭṭāma*) is also used, applied to the muzzle of the young in the company of its mother. In the hours of milking the young are kept apart. After weaning, the kid becomes a *djafr* (pl. *djufār*) and the lamb *kharūf* (pl. *khirfān*) and, before it is one year old, the sex is distinguished, with *djady* and *ʿuṭʿuṭ* for the he-kid, *ʿanāḳ* for the she-kid, *ḥamal* and *immar* (dial. *ʿallūsh*) for the he-lamb and *rikhl* and *immara* for the she-lamb. When one year has passed, with the goats, the male is the *ʿatūd* or the *ʿarūḍ*, then, around two years, the *djadhaʿ* or *tays*, whereas the female becomes *ʿanz* or *ṣafiyya*; progressively each of them are called *thanī, rabāʿī, sadīs* and after seven years, *sāligh*. The he-goat sire is, in the dialects, the *ʿatrūs*. As for the sheep, by a similar terminological graduation, one arrives at the *kabsh* for the ram and the *naʿdja* for the reproductive ewe; castration of the males is not always practised, for it is proscribed by Ḳurʾānic law and the he-lambs and kids remaining are taken, in the care of the *djallāb*, to the abattoirs (*madjzar* pl. *madjāzir*) of the urban centres or delivered directly to the butcher (*ḳaṣṣāb*) of the nearest village. Those which supply the feasts and ceremonies of the tribal group are only an infinitesimal part.

According to the social organisations peculiar to each Muslim people, the groupings of sheep and goats can be very variable as to the number of heads of livestock; also, the term "troupeau" (French) and "flock" (English), without numerical precision, do not have a direct correspondent in Arabic. The small family flock of ten to forty animals (*ḳaṭīʿ*, dial. *rasla, ḳaṭʿa, nūba*) is called *fizr*, if there are only sheep, and *ṣubba*, if there are only goats. With the hundred, one speaks of *ḳīnā* of sheep and *ghīnā* or *ḳawṭ* of goats. With two hundred, it is the *khiṭr* and above that the *waḳīr* without distinction of species. The joining together, for common needs, of several *waḳīr* with their dogs and carrier donkeys forms a *firḳ* or a *mughnam*, which may number several thousand head; such a moving mass can be described further as a *ghanam mughannama* (comp. "a sea of sheep and goats") and with this idea of multitude it will be said, *aḍʿana ʾl-ḳawm wa-amʿaza* "the group is very rich in sheep and goats".

Equally highly variable is the condition of the pastor (*rāʿī*, dial. *sārih*, Berber *ameksa, amaḍan*), shepherd or goatherd, or most often, both at once, according to the framework of the society in which he is integrated. Among the sedentaries, a youth suffices to guard the few beasts of the family circle, but, in some villages, the livestock of each is gathered into a single flock which may be quite large, each animal bearing the mark of its owner, and they also have recourse to a professional shepherd. He is engaged under a renewable seasonal contract covering two seasons (*kamāla*, either summer-autumn, or winter-spring) and he is paid mainly in kind. On the day of his engagement he receives a small sum as a deposit, the outer garment (*ʿabāʾ, burnus*, Morocco *selhām*) indispensable against inclement weather, a large woollen haversack (*kurz, ʿamāra*) to carry his personal possessions and, also, for those of the newborn who may arrive during the journey for pasture, and a crook (*ʿukkāz, ḥanfa*) which can be a strong club as a defensive weapon. He is assured of daily food and at the expiry of his contract, he has the right to twenty lambs and kids (*riḍāya*). In the case of his contract not being renewed, he gives back the deposit, the cloak and the haversack.

In fact, the good shepherd is automatically re-employed and his services for the same employer can last a lifetime.

However small a flock may be, the shepherd has to be vigilant at all times; he must prevent the animals from trespassing on the cultivated lands, round up the stragglers, ward off every danger from predatory carnivores and thieves, assist a female in her labour and take care of the newborn. He is bound to compensate for every animal that dies through his negligence, but if a wolf or lion or panther kills it despite his intervention, he is cleared, if he can bring the carcase (*biṭāna*) to justify himself. This last clause hardly functions nowadays where governments have practically eliminated the insecurity reigning in the isolated regions, but the danger from thefts has not entirely disappeared. In addition to his dog, the shepherd may have the help of a youngster (*rassāl*) to keep the young apart while their mothers are milked or to lead the animals in small groups to the watering place. It is in this school that the boys learn the craft. Even among his flock the shepherd finds auxiliary help with, on the one hand, the "leader" (*dalūl, marʿī, marīr*) wearing the chief's alfa collar (*shabbāḥ, shaband*), and old ram or billy-goat whom the flock follows blindly in ranks fleece against fleece and, on the other hand, the "haversack bearer" (*karrāz*), whose solid horns scarcely suffer from this extra burden. In the evening, the flock having returned to its covered or open fold (*zarb, zarība, marḳad, ḥazīra, ṣīra*), the shepherd goes to eat with his master and returns to sleep among his animals. They, confident in the man, obey his orders expressed by fixed onomatopaeic calls such as *birbir*! to gather them together, *sikk*!, *ikht* !, *ḥerr* !, *tūtū*!, *terr*! to urge them on, *hish* !, *ḳaḥḳaḥ* !, *taḥtaḥ* !, to stop them and *hirhir*! to invite them to the water. Contrary to the usage in Christendom, the animals of flocks, in Islam, do not wear bells.

In the mountainous regions (the Atlas, Lebanon, Sinai, etc.) an annual migration takes place following the periods of the growth of herbage at high altitude. For these fixed migrations the flocks of several clans or villages are joined together and the long line of horns and undulating chines slowly climbs the slopes accompanied by the cohort of dogs, mules and donkeys charged with the food and necessary impedimenta for camps of several months. For this occasion, each owner delegates a man in charge (*ḳaʿīd*) to coordinate and control the movements of the group and to ensure the feeding of the shepherds. This putting out to grass (*tarbīʿ*) can be prolonged for four or five months according to the atmospheric conditions encountered at the high altitudes. During the hot hours and the night, the animals are put under cover in caves (dial *ḳaṭṭīn, maʿzab, shaḳīf*) and other natural shelters.

Among the small sheep nomads, all the men are shepherds and their life is much harder than that of the sedentary shepherds, for it is linked to a constant quest for pastures and drinkable water, while having to face the merciless competition of the great camel nomads.

The condition of the shepherd of small livestock, nothwithstanding the eulogistic Prophetic traditions, concerning him, seems always to have been the object of disrepute in general Muslim opinion; to be a *shāwī* still retains a pejorative nuance. In the eyes of the cultivator, the shepherd passes for a pilferer, when he is not reproached with particularly shameful practices with his animal. In pre-Islamic Arabia the protection of the livestock was often the task of slaves and, in the Middle Ages, this scorn for the pastor might also

be reinforced by racial oppositions this Bedouin's curse hurled at his adversary: "If you lie, may you draw milk seated" (= may Allah change your noble she-camels into vile ewes). In the Maghrib, the shepherd is in the lowest rank of the country proletariat, lower than the *khammās* and the jobbing workman and, in the mouth of the countrywomen with their unpolished language, the supreme insult hurled at a rival is that of "maid for shepherds".

In spite of so much disgrace and by force of circumstances, the pastor of small livestock remains, in all the lands of Islam, one of the indispensable artisans, ensuring the subsistence of the rural and civic populations. Furthermore, the shepherds, constantly observing nature and the sky, and this since the domestication of the goat and sheep (the verb *raʿā* means at the same time "to pasture the flock" and "to observe the stars"), have made a great contribution through their experience acquired in the progress of the astronomy and meteorology proper to each season. To be convinced, one has only to consider the sum of precise evidence preserved, in a concise form, in the rhymed sayings that these contemplators of the heavenly vault composed for each of the twenty-eight *anwāʾ* of the year; these sayings mention the notable influences on the flocks of the evolution of time in the course of the twelve months; for the craftsman, their laconicness is very telling. By way of example, two of these sayings taken from the fifty best known will suffice to sketch the rough contrasts of climate which the shepherd had to endure. The first evokes the dog-days and the scarcity of water in these brief terms, "When Sirius rises [at the end of June] in the morning (*safarā*), if you do not see rain (*maṭarā*), do not give food to the she-lambs or he-lambs (*immarā*)…" [for they will risk dying of thirst]. The second relates to mid-December when the water becomes ice, "When *al-Naʿāʾim* ("the Ostriches", i.e. Sagitarii) rise, the animals stay motionless (*al-bahāʾim*) because of the constant (*al-dāʾim*) ice, and the cold awakens every sleeper (*nāʾim*)". With this monthly guide to the constellations the shepherds regulate their migrations which, far from straying, lead them where their flocks will find the best conditions of subsistence.

Apart from the vicissitudes arising from the harsh weather to which the animals of the flock are exposed, they can also be the victims of accidents and individual or collective illnesses. In the past, with the lack of effective therapeutics, the shepherds had to lament a percentage of certainly high losses. Epidemics (*wabāʾ, mawtan*) would occur periodically with their terrible consequences; spontaneous abortion (*ikhdādj, isḳāṭ, ikhfād*), agalactia (*shiṣāṣ*) and sterility (*ʿuḳr*). The causes were attributable especially to many neighbouring viruses of the brucella type entailing brucellosis or Maltese fever (*ḥummā māliṭiyya*) and foot-and-mouth disease (*djilākh, ḥummā ḳulāʿiyya*). The sheep pox (*amīha, nabkh*) also ravaged them, as did coccidiosis (*djuʿām*), bringing on diarrhoea and anaemia. Sarcoptic mange or "blackmuzzle" (*naghaf*), psoroptic mange (*ḳuḥāl*, dial. *bū ṭagga*), gastro-intestinal strongylosis and flukeworm due to the small fluke of the liver (*Dicrocoelium lanceolatum*), all leading to aqueous or dry cachexia, also destroyed a good number of animals. Microbial infections of the feet and hooves such as foot rot (*iltihāb al-fawt*) and hoof inflammation (*ḳuwām*), which could lead to the dropping-off of the horn cover and decalcification of the instep (*ʿuḳāb, khumāl*), condemned their immobilised victims to enforced slaughter. Infections of the respiratory tubes were endemic, with pleuropneumonia of goats

(*ḳaṣaba*, dial. *bū farda*), pulmonary strongylosis provoking sneezing (*kudās, nat͟hīr*) and mucus or glanders (*mu͟khāt, zi͟khrīṭ, ru͟ghām*), attested by the Prophetic tradition cited above. Finally, cases of cenurosis or turnsick (*t͟hawal*, dial. *bū n͟shīnī͟sh*) were frequent, as were swellings (*ḥubāṭ*) and convulvus of the oesophagus (dial. *farrās*) due to dehydration. Against this cohort of invisible enemies constituted by the microbes, the shepherd would find himself totally unarmed, attempting, despite everything, some empirical treatments for the external infections. Purulent sores were cauterised with a red-hot iron (*kayy*), and mange (*d͟jarab*) and ringworm (*ḳarāʿ*) are, even nowadays, treated by the application of tar (*ḳaṭrān, ḳīr*). It is with tar also that the waters of the brackish or magnesian watering place are purified (*ma͟shad͟j*) and, in Syria, a billy-goat or ram carries around his neck a cow-horn (*baṭṭāl*) full of this substance to provide for the hour of watering. Many other therapeutics, sometimes extravagant, mixed with conjuratory magical practices take place everywhere in Islam, as in Christendom, and the list would be very long. Meanwhile, in modern times, veterinary science is propagated under the auspices of the authorities of each state, and competent services periodically bring effective prophylactic measures, to the countryside by means of vaccination (*talḳīḥ*), disinfection (*taṭhīr*) of contaminated sites and by injection (*ḥaḳn*) of powerful medications absorbed into the body of the sick patients; it can also be confirmed that at present the flocks of sheep and goats of the Muslim countries are almost freed from the scourge of the great epidemics.

(F. Viré)

3. Forbidden Flesh: The Animal Kingdom and the Religious Law

Animals and Muslim law

Islam concerns itself with animals in many other connexions, and there is hardly a chapter of Muslim law which does not deal with them. Domestic animals are subject to the *zakāt*; the sale of animals is bound by restrictions in connexion with the legality of the consumption of their flesh (*e.g.*, it is forbidden to sell pigs; however it is permitted to sell leeches, though it is forbidden to eat them); the question of their barter against other animals or of a contract for delivery with prepayment is also debated; ritual sacrifices are the subject of precise instructions as is the killing of animals intended for eating; to this chapter is connected that of hunting and game [see ṣayd] and, secondarily, of furs; the prohibitions imposed on pilgrims in a state of *iḥrām* form another legal question, while some traditions of the Prophet lead to the posing of the question whether, outside the state of *iḥrām*, it is legal to kill certain animals and, on occasion, to eat their flesh. Thus the fundamental problem is reached, which concerns on the one hand food, and on the other the use for other purposes of one or another portion of a forbidden animal. In what follows we shall concern ourselves with the juridical status (*ḥukm*) of the various species of animals.

The Ḳurʾān enumerates on several occasions the prohibitions concerning the eating of the flesh of an animal which has not been ritually slaughtered, concerning the spilt blood, and the pig (V, 4/3; see also II, 168/173, VI, 146/145, XVI, 116/115), but in the last verse it

provides for the lifting of the prohibitions in a case of absolute necessity (for the spilt blood, we remember that the early Arabs, when they were dying of thirst in the desert, sometimes resigned themselves to slaughtering a camel and drinking its blood). Traditions of the Prophet and Islamic jurisprudence concede this *ḍarūra*, but in general they are much stricter, for they impose prohibitions upon species of which nothing is said in the Ḳurʾān, but without, it seems, restoring pre-Islamic practices (on which at present we possess only inadequate data). In fact the juridical schools have endeavoured, in a completely empirical way, to put an end to the uncertainty which existed in the early period of Islam and to draw up lists of animals the consumption of which is lawful (*ḥalāl*), prohibited (*ḥarām*) or reprehensible (*makrūh*), without reaching absolute agreement.

In order to arrive at the *ḥukm*, several general criteria, Ḳurʾānic or based on tradition, have been applied by all the schools. Thus, by virtue of V, 97/96 "Permitted to you is the game of the sea and the food of it", all fish are lawful and their flesh may be eaten without ritual slaughter; however, some marine or aquatic animals are declared *ḥarām* or *makrūh*, or are still the subject of discussions, for they come within the sphere in which other criteria are applied; thus the frog, which would normally be *ḥalāl*, is regarded as *ḥarām* because the Prophet forbade the killing of it. Moreover, some *fuḳahāʾ* zealots, in their meticulous search for anything impure, condemn the eating of those aquatic animals which have names resembling those of unlawful land animals ("dog of the sea", "pig of the sea", "ass of the sea"; their zeal leads them to prohibit an animal which has the same name as a forbidden animal even in a language other than Arabic, as with the ass, which in West Africa has the same name as the pig), or those which have the same shape (especially the eel, which is the same shape as the serpent). They go so far as to declare unlawful all marine creatures which have not got the shape of fishes (Ḥanafīs), with the explanation that the Ḳurʾānic text authorizes fishing, but not necessarily the eating of everything caught. Special cases are the scatophagous fishes, fishes found inside the belly of another fish, and above all the *ṭāfī*, dead fish floating in the water, which is lawful only for the Mālikīs and the Shāfiʿīs, though the Ḥanafīs permit the *ṭāfī* if it has been killed by an accident and has not died a natural death, which leads to a discussion of whether death from heat or cold is to be considered as natural. The crustaceans are often unlawful or reprehensible, as is the whole class of animals with shells.

By virtue of the verses (V, 6–7/4–5) "The good things (*ṭayyibāt*) are permitted you", we find included in the chapter of what is *ḥalāl* those animals whose flesh is esteemed for its flavour (chickens, sheep, etc.); conversely, the peacock and other animals are declared *ḥarām* because of the bad quality of their flesh. By the same token *istiḳdhār* or *istiḳhbāth*, *i.e.*, the habit of consuming unpleasant food, causes animals possessing it to be classed among those which are *ḥarām: e.g.*, scarab beetles. In this field there is a certain amount of indecision and not a little subtlety: the stork for example, which would be *ḥalāl*, is regarded as *ḥarām* because it eats snakes. Snakes themselves are *ḥalāl*, but eating them classes the stork among the carnivores. Indeed, among the Traditions of the Prophet which are also invoked, there is one, which was to serve also as the basis for a division into *bahāʾim* and *sibāʿ* (see below), and according to which all carnivores are

forbidden whether they are mammals equipped with fangs (*dh̲u nāb*) or birds provided with claws (*dh̲ū mikh̲lab*); but it is not universally accepted, and the Mālikīs permit the eating of the flesh of birds of prey, while the Awzāʿīs consider that no bird is *ḥarām*. All the jurisconsults regard the cat, the dog, the wolf, the crocodile etc. as *ḥarām*, and travellers report with disgust any cases of eating dogs which they witness; the fox is generally considered as lawful, the jackal and the wild cat are the subject of disagreement, and the hyena is lawful, except for the Mālikīs, who pronounce it *makrūh*. (The Prophet, questioned on the lawfulness of the hyena, is said to have replied: "But who eats the hyena?"). The classification of the elephant is disputed, for although it is a herbivore, it possesses means of defence which are termed *nāb* in Arabic.

According to another *ḥadīth* the Prophet is said to have forbidden the killing of bees (because God made a revelation to them), ants (for the same reason), frogs (because they were close to God when the Throne was upon the water and because their croaking is a praise to God), hoopoes (because of the part which one of them played with Solomon), and finally the *ṣurad* (magpie) which was the first to fast; it follows that it is also forbidden to eat the flesh of these animals, although opinions do not altogether agree on this. Swallows and bats are the subjects of the same prohibition because the Prophet forbade the killing of them for similar reasons, but the jurisconsults are far from agreeing on the authenticity of the *ḥadīth̲s* about them. Conversely, certain animals are *ḥarām* because the Prophet ordered them to be killed for their impious conduct; these *fawāsiḳ* are the kite (*ḥidāʾa*), the black and white crow (*abḳaʿ*), the scorpion, the mouse and the *ʿaḳūr* dog; the kite and the dog are already included in another prohibition; the other varieties of crow are lawful, while the prohibition concerning the mouse extends to all rodents with the exception of the jerboa, which in any case is sometimes classed among the *ḥasharāt* or insects, which are considered as *ḥarām*, except by the Mālikīs; thus the scorpion is already forbidden under this heading, but the idea of *ḥasharāt* is rather confused, for among them is found the lizard (which is *ḥalāl*) and the hedgehog (*ḥalāl* among the Shāfiʿīs); on the other hand, locusts, which form a supplementary food for the Bedouin, are not forbidden by any school, even if found dead (this, with fish, is one of the two *maytas* which according to one *ḥadīth* are lawful). But some insist that they must have been intentionally killed and their heads cut off. (Yet against this may be cited ʿAlī, who is reputed to have said *kulhu kullahu* "eat them all", when shown a heap of locusts some of which were already dead). Reptiles are in general considered unlawful or reprehensible, except among the Mālikīs who merely apply the criterion of harmfulness and authorize the eating even of poisonous snakes if the poisonous part has been cut off. The lizard (*ḍubb*), however, is often recognized as lawful, by virtue of some *ḥadīths* which state that the Prophet abstained from them merely because of personal dislike, but some others say that this species represents a tribe of the Banū Isrāʾīl which had been metamorphosed, and this leads to their being prohibited. Animals which are considered to have no liquid blood are in general regarded as lawful, since blood is what constitutes the impurity of animals which have not been ritually slaughtered. Many, however, are forbidden (except by the Mālikīs) because of the disgust which is felt for them and which causes them to be classed among the *khabāʾith*, "unclean foods", discouraged by the Ḳurʾān (VII, 156/157). This vicious circle, from the

logical point of view, is moreover applied to other foods and allows all prohibitions to be canonized. This is particularly true for the *ḥaṯarāt al-arḍ*, (sometimes *ḫaṯāṯ*), a term which embraces in a variable and inconsequential way the small animals which live on the ground, and are in general forbidden or reprehensible, in spite of a *ḥadīṯ*. They include scorpions, all kinds of insects, and worms. Concerning the latter there is much disagreement, for it is difficult not to eat them accidentally with other foods. Some schools make efforts to distinguish those which have been engendered by the food itself from those which have not, those which are alive or dead, those which have *rūḥ* or not.

In general birds without talons are permitted, but certain of them are the subjects of discussion, and receive different classifications according to the schools; this is the case notably with the parrot and the owl.

It goes without saying that a certain number of animals have not received any classification, because it has not occurred to anyone to eat their flesh. Similarly for very rare species the question has not been solved because it has not arisen; thus al-Damīrī mentions that nobody has been concerned with the rhinoceros, which he himself considers at first sight to be *ḥalāl*; the case of the giraffe is disputed; and finally the monkey is regarded as *ḥarām* except by the Mālikīs; here there intervenes, as in the case of the *nisnās* the new idea of a resemblance between animals and humans, which, by a kind of natural law, prevents people eating these creatures without a formal prohibition being necessary.

Among domestic animals, while the camel, the ox, the sheep etc. present no problem, the equidae give rise to disagreements; the horse is lawful for the Shāfiʿīs and the Ḥanbalīs, while the other schools consider it *makrūh*; the domestic ass is *ḥarām*, except for the Ḥanbalīs who regard it as *makrūh*, while the wild ass is *ḥalāl* for all schools except the Ḥanafīs. The mule, arising from a crossing of two differently classified species, is prohibited, except that, at least for those who regard the horse as *ḥalāl*, the offspring of a horse and a wild she-ass is permitted.

In contrast to the other schools, the Ẓāhirīs, and particularly Ibn Ḥazm, remain faithful to their fundamentalist criterion and base themselves on Ḳurʾān, VI, 119 "…seeing that He has distinguished for you that He has forbidden you", to reject prohibitions which are not found in the Ḳurʾān.

The Shīʿīs do not differ radically from the Sunnīs; although they differ from them on points of detail, they nevertheless base their decisions on identical criteria. Thus the *ḳāḍī* al-Nuʿmān, who sets forth the doctrine of the Ismāʿīlīs, points out that God has forbidden the eating of carrion, spilt blood and pork (Ḳurʾān, V, 4/3) and that the Prophet declared unlawful carnivores with fangs and birds with talons; he adds that the hyena and the fox are forbidden, and that the eating of the lizard, the hedgehog, insects (*ḥaṯarāt*), snakes and all the small reptiles or insects included under the name of *ḫaṯāṯ* is to be discouraged; only locusts caught alive while in flight are permitted. However, the Shīʿīs include among the flesh which is forbidden or reprehensible that of several particular birds (the lark etc.) and that of two new categories: birds which hover more than they fly, and birds which lack both a gizzard and other organs. The Ismāʿīlīs authorize the eating of horse-meat only in the case of an animal useless for any work, and they forbid absolutely the flesh of mules and domestic donkeys; also *ḥarām* are animals which habitually eat excrement (*ǧallāla*), unless they have been fed

a certain time on herbage. It is also *ḥarām* to consume the milk or the eggs of forbidden animals, but abstention from eating certain parts of permitted animals—the glands, the spleen, the genitals etc.—is also recommended. Among aquatic animals those which have no *ḳi<u>sh</u>r, i.e.*, scales (cf. Leviticus, XI, 9, Deut. XIV, 9) are forbidden, as are those which are not alive when caught. In cases of necessity, however, all these prohibitions are waived.

These general considerations leave the way open for argument, especially in the case of animals which are difficult to classify; an example is the cat-fish (*<u>dj</u>irrī*). Divergences appear as well among the <u>Sh</u>ī'ī sects; thus Ibn Baṭṭūṭa relates that for the Ḥanafī inhabitants of Sinope (Ṣanūb) the best way of assuring themselves that a traveller and his companions adhered to Sunnism was to offer them a hare, for the Rāfiḍīs do not eat the flesh of this animal (though the Ismā'īlīs do).

To the question of the legality of killing certain animals is added the forbidding of pilgrims in the state of *iḥrām* to shed blood, from which arises the problem of how one is to deal with vermin; the question arises also in connexion with prayer.

At another level arises the question of the way in which animals are to be treated; for example it is permitted to kill a cock, but the Prophet forbade reviling it because it performs the religious function of awakening the Faithful at the time of prayer; the same rule applies to fleas "who awakened a prophet". In general Muslims are counselled to treat animals, and particularly their mounts, well, for they will have to give account in the next world of any cruelty which they have inflicted on them in this.

The problem presented by the use of the parts of animals regarded as *ḥarām* is a complex one which cannot be given here the full treatment which it deserves. By way of example, among the Mālikīs, the Muslim who has had of necessity to eat the flesh of an animal not ritually slaughtered may not use its skin as a prayer rug, nor may he sell it. Similarly, before the skins of wild beasts (*sibā'*) may be used as prayer rugs, or sold, it is necessary for them to have been ritually slaughtered. Although pigs are forbidden in the Ḳur'ān, the Mālikīs allow the use of hogs' bristles.

It is hardly possible within the limits of this article to enlarge on the subject of the lawfulness of animals, the complexity of which in Islamic law is due to what the doctors consider to be the insufficiency of the Ḳur'ānic regulations. Prohibitions concerning food being considered necessary—as is proved by the fact that later "prophets" hastened to enact more of them—the schools, in order to develop the system outlined in the verses at the beginning of this section, applied various criteria (on which they are not always unanimous), so that in order to present this intricate subject more completely, it would be necessary to list all the animals and to indicate for each one the *ḥukm* adopted by each of the different schools. It would also be instructive to compare these classifications with the Biblical regulations (Leviticus, XI, 1–47; Deuteronomy, XIV, 4–21; see also Isaiah, LXV, 4, LXVI, 3, 17) and with the criteria laid down: it is lawful to eat ruminant quadrupeds with cloven hoofs (this excludes the horse, the donkey, the camel, the rabbit, the hare and the pig), also aquatic animals equipped with fins and scales; birds which are held in abomination and reptiles which are lawful are listed separately. The prohibitions set forth in the Old Testament are regarded in the Ḳur'ān (IV, 158/160) as a punishment inflicted on the Jews for their iniquity and their disobedience to God, and

the Holy Book of Islam had no reason to be so severe, but the scruples of the *fuḳahāʾ* led them to adopt a more rigorous position and to restrict the alleviations from which Muslims could benefit. In certain cases custom supersedes a legal ruling which is considered to be too liberal: thus, the coney (*wabr*) is in general considered lawful, in contrast to the Biblical regulation, but it is the object of prohibitions based on custom, for example among the Egyptian Bedouin, or among the settled communities of Southern Arabia.

(Ch. Pellat)

Carrion

The Arabic word *mayta*, feminine of *mayt*, means dead (used of irrational beings); as a substantive it means an animal that has died in any way other than by slaughter. In later terminology, the word means firstly an animal that has not been slain in the ritually prescribed fashion, the flesh of which therefore cannot be eaten, and secondly all parts of animals whose flesh cannot be eaten, whether because not properly slaughtered or as a result of a general prohibition against eating them.

In addition to sūra XXXVI, 33, where *mayta* appears as an adjective, the word occurs in the following passages in the Ḳurʾān in the first of these meanings: XXI, 116: "He has forbidden you *mayta*, blood, pork and that over which another than Allāh has been invoked; if however anyone is forced [to eat these] without wishing to transgress or sin, Allāh is merciful and indulgent" (from the third Meccan period, since VI, 119 may refer to this context and the appearance of the same exception for cases of coercion in VI, 146 (cf. below) is then only easily explained in view of the whole trend of the passage, if there were an earlier passage, namely XVI, 116, in which it was given full justification); VI, 140, 146: "They have said: 'What is in the womb of this cattle belongs to the males, and is forbidden to our females'; but if it is *mayta* (stillborn), all have a share in it… Say: I find in what is revealed to me nothing forbidden, which must not be eaten, except it be *mayta* or congealed blood or pork—for this is filth—or a slaughter at which another than Allāh is invoked, but if anyone is forced [to eat it] without wishing to commit a transgression or sin, thy heart is merciful and indulgent" (of the third Meccan period); II, 168: "He has forbidden you *mayta*, blood, pork and that over which another than Allāh is invoked but if anyone is forced [to eat it] without wishing to commit a sin or transgression, it is not reckoned as a sin against him; Allāh is merciful and indulgent" (from the year 2 of the *hidjra*, before the battle of Badr): V, 3: "Forbidden to you is *mayta*, blood, pork, that over which another than Allāh is invoked, and that which has been strangled, killed by a blow or a fall, or by the horns [of another beast], that which has been eaten by wild beasts—with the exception of what is made pure—and that which has been sacrified to idols… But if anyone in [his] hunger is forced to eat of them without wishing to commit a sin, Allāh is merciful and indulgent" (in all probability revealed after the valedictory pilgrimage of the year 10).

It is quite evident from sūra, XI, 140, that the *mayta* was of some significance for the Meccans in the many laws about food with which Arab paganism was acquainted. Although it is no longer possible to define exactly the part it played (even the statements recorded by al-Ṭabarī from the earliest interpreters of this passage, which moreover only refers to a detail, reveal

the complete disappearance of any reliable tradition), it may be assumed without misgiving that the Ḳurʾānic prohibition contained a corresponding pre-Islamic prohibition, although it perhaps modified it. Both go back to the religious reluctance to consume the blood of animals, and indeed in all the Ḳurʾān passages quoted, blood is mentioned alongside of *mayta*. It is unnecessary to assume that Muḥammad was influenced by Judaism on this point, and the suggestion may be rejected especially as the prohibition in its stereotyped form occurs again in sūra II, 168, just at the time of vigorous reaction against Judaism, and in sūra VI, 147 (Medinan, a late insertion) which contrasts the prohibition of *mayta*, etc., with the Jewish laws relating to food. The meaning of *mayta* is explained in the latest passage dealing with it, V, 3: in the second half of the verse the principal kinds of *mayta* are given (with the exception of the animal that dies of disease), which had already been mentioned in general terms; the commentators were thus able to interpret the single cases given as examples wrongly as being different from the *mayta* proper. The purification (in the Ḳurʾān only mentioned in this passage) must mean ritual slaughter, by which, even if done at the last moment, the animal does not become *mayta* but can be eaten.

These prescriptions of the Ḳurʾān are further developed in the traditions. According to the latter, it is forbidden to trade in *mayta* or, more accurately, its edible parts; some traditions (mainly on the authority of Aḥmad b. Ḥanbal) even forbid any use being made of all that comes from *mayta*; others again expressly permit the use of hides of *mayta*. An exception from the prohibition of *mayta* is made in the cases of fish and locusts; these are in general considered as the two kinds of *mayta* that are permitted, i.e. no ritual slaughter is demanded in their case (because they have no "blood", cf. above). While some traditions, extending this permission by the earliest *ḳiyās*, say that all creatures of the sea, not only fishes, can be eaten without ritual slaughter, including even seafowl (in this case it is said that "the sea has performed the ritual slaughter"), others limit the permission to those animals and fishes which the sea casts up on the land or the tide leaves behind, in contrast to those which swim about on the water. But there is also quoted a saying of Abū Bakr expressly declaring what swims on the surface to be permitted. In this connection, we have the story of a monster cast up by the sea (sometimes described as a fish) which fed a Muslim army under the leadership of Abū ʿUbayda when they were in dire straits; but in this tradition and in the interpretation that has been given it (that they only ate of it out of hunger i.e. took advantage of the Ḳurʾānic permission for cases of need) is clearly reflected the uncertainty that prevailed about such questions which were on the border line. In the traditions, we find it first laid down that portions cut out of living animals are also considered *mayta*. The way is at least paved for the declaration that all forbidden animal-dishes are *mayta*. The regulations found in the Ḳurʾān appear again here, e.g. the permission to eat *mayta* in case of need and to slay properly dying animals at the moment to prevent them becoming *mayta*.

Some traditions handed down through Ḥammād from Ibrāhīm al-Nakhaʿī bring us to a somewhat late period: one says that of the creatures of the sea, only fishes can be eaten; another, which is found in two versions, limits the permission to what is thrown up by the sea or left behind by the tide; ritual slaughter is not demanded in this case. The question whether the embryo of a slaughtered dam requires a

special purification, i.e. ritual slaughter, is raised in one tradition and decided in the affirmative.

The most important regulations of Muslim law about *mayta*, which express the last stage of development, are as follows. It is unanimously agreed that *mayta* in the legal sense is impure and "forbidden" (*ḥarām*), i.e. cannot be eaten, and also that fish are exceptions to this; the Mālikīs and Ḥanbalīs also except the majority of creatures of the sea, and according to the more correct Shāfiʿī view, this applies to all marine creatures (the Ḥanbalīs here hold the opinion of Ibrāhīm al-Nakhaʿī, except that the two ideas of "thrown up" and "swimming on the surface" are later overlaid and destroyed by the to some extent synonymous phrase "slain by another cause", "died of itself"). The edible parts of *mayta* are also *mayta*, as are the bones, hair etc. among the Shāfiʿīs, but not the Ḥanafīs, and among the Mālikīs only the bones; the hide, when tanned, is considered pure and may be used. Emergency slaughter (*dhakāt* or *tadhkiya*; ritual slaughter in general is *dhabḥ* or *naḥr*) is, according to the Ḥanafīs and the better-known view of the Shāfiʿīs (also according to al-Zuhrī), permitted, even if the animal will certainly die, provided it still shows signs of life at the moment of slaughter. According to the view predominant among the Mālikīs, such slaughter is not valid and the animal becomes *mayta* (in contrast to Mālik's own view). The question of the embryo (cf. above) is answered in the affirmative by the Ḥanafīs, following Ibrāhīm al-Nakhaʿī and Abū Ḥanīfa (Shaybānī himself held the Mālikī view, to be mentioned immediately below) but in the negative by the Mālikīs and Shāfiʿīs (in this case, it is said that "the ritual slaughter of the dam is also the ritual slaughter of the embryo"), except that the Mālikīs made it a condition that the embryo should be fully developed (Mālik himself also demanded its slaughter "to draw the blood from it" in the case where the embryo had been dropped). That anyone who is forced to eat *mayta* may do so, is the unanimous opinion; only on the questions whether one is bound to eat *mayta* to save his life, whether he should satisfy his hunger completely, or only eat the minimum to keep life alive, etc., is there a difference of opinion. The Shāfiʿīs and Ḥanbalīs further demand that one should not have been brought to these straits through illegal action (a different interpretation of the Ḳurʾānic regulations).

A clear definition of *mayta* and its distinction from other kinds of forbidden animal foods was never reached. Sometimes it is separated on the authority of the Ḳurʾānic passage itself from its own four subdivisions given in sūra V. Sometimes its validity is extended over extensive allied fields. As is evident from the *fiḳh* books, this terminological uncertainty has not infrequently caused still further confusion in the discussion of differences of opinion.

(J. Schacht*)

4. Hunting

Hunting, Fishing

Sayd (Ar.), a masc. noun and noun of action from the root *ṣ-y-d* which, as in Hebrew, evokes both the idea of the pursuit and capture of wild animals, by earth or sea, which can be eaten as game, and also these animals themselves, i.e. all game, whether caught by hunting or fishing. In all its acceptations, the root *ḳ-n-ṣ* is its exact equivalent.

The ineluctable need for daily sustenance has led mankind, like all other living

beings, from the time of their appearance on earth, to practise both hunting and fishing together with the gathering of wild fruits and grain, and mankind has accordingly ceaselessly exercised its ingenuity in finding the best methods here for achieving the maximum return for effort. Thus there has been a constant striving towards perfection in methods of hunting and fishing.

For hunting game by land, the methods of capture (*maṣūda, miṣyada, maṣyada*, pl. *maṣāyid*) are numerous. A passive mode costing the least effort is the setting of nets (*shabak*) and snares with draw-nets (*ḥibāla, uhbūla*, pl. *ḥabāyil*); and there is also the covered-over pit-trap (*ḥuḳna, ughwiyya, mughawwāt, wadjra, dafina*). Then comes the method of hunting with a bow (*ramy, rimāya*) or, otherwise, with a cross-bow or blow-pipe and, at present, with firearms. But out of the various methods, in the Islamic world and during mediaeval times, one of the most favoured by princes and nobles was the chase (*ṭard, muṭārada, ṭirād*), on foot or on horse-back, with the aid of domesticated or tamed carnivore animals (*ḍārī*, pl. *ḍawārī, ṣayūd*, pl. *ṣuyud*), such as the gazelle-hound or *salūḳī*, the cheetah and the caracal lynx (*ʿanāḳ al-arḍ*). These precious hunting auxiliaries were launched against the gazelle, antelope, wild ass (*ḥimār al-wahsh*), ibex (*waʿl*) and ostrich. According to the region, they sometimes served for tracking down wild beasts with furs, such as the panther, leopard and even the fennec fox. Parallel with hunting by the chase, hunting by the air, i.e. with raptors [see bayzara], was always a favoured pastime for all social classes in the Muslim lands, whether high-flying with falcons or low-flying with hawks for the capture of small, furry game, such as the hare and of that with feathers, such as the partridge (*ḥadjal*), sand-grouse, bustard (*ḥubāra*), wild geese (*iwazz*), duck (*baṭṭ*) and teal (*ḥadhaf*). Certain falcons were also trained to tie down and blind antelopes and wild assess, thus facilitating their capture by the hunting hounds. The smallest-sized birds like blackbirds and thrushes were taken by means of snares and nooses (*sharak*, pl. *ashrāk*) placed in line on a taut cord.

According to Islamic law, the hunter and fisher (*ṣayyād, ḳannāṣ*) were subject to rules regarding the ritual slaughter of captured game in order to preserve the lawfulness of their consumption; all these rules are set forth in detail by al-Damīrī in his *K. al-Ḥayawānāt al-kubrā*. From it, there results that, in order for it to be lawful, game should not be killed on the spot and picked up dead, so that its throat can be ritually cut.

(F. Viré)

Hawking

Bayzara (Ar.) denotes "the art of the flying-hunt", and is not restricted to the designation of "falconry". (Its Persian origin (from *bāz*: goshawk) is more closely related to the notion of "ostring art"). Derived from *bayzār*, "ostringer", an Arabicised form of the Persian *bāzyār/bāzdār*, it was preferred to its dual form *bāzdara*; the words *bāziyya* and *biyāza* were scarcely used in the Muslim Occident. The use of rapacious predatories (*kāsir*, pl. *kawāsir*) as "beasts of prey" (*djārih*, pl. *djawārih*) was undoubtedly known to the Arabs before Islam, and Imruʾ al-Ḳays sketches, in his *ayyam al-ṣayd*, some descriptions of flying-sport. However, hawking only assumed importance with them after the great Muslim conquests which brought them into contact with the Persians and the Byzantines. It quickly won the favour of the new leaders who discovered in it the possibility of diversion and of satisfying

peacefully their passion for riding. Caliphs and high Muslim dignitaries were zealous in elevating it, with venery, to the rank of an institution under the direction of a "master of chases" (*amīr al-ṣayd*), and later (*amīr ṣḥikār*). The Umayyad caliph Yazīd b. Muʿāwiya (680–83) was one of the first to show an unbridled enthusiasm for the flying-hunt. Historians, biographers and chroniclers in the Arabic language provide information, each according to his own period and country, on the current practice of hawking, and relate for the occasion lively anecdotes of the exploits of certain princes in this field. Much more valuable is the information concerning *bayzara* found in certain encylopedic works, edited for the purpose of *adab* or philological learning, such as the *K. al-Ḥayawān* of al-Djāḥiẓ, the *Al-Mukhaṣṣaṣ* of Ibn Sīda, the *K. Ṣubḥ al-Aʿṣḥā* of al-Ḳalḳashandī, and the *K. Murūdj al-Dhahab* of al-Masʿūdī.

The Maghrib and Muslim Spain, as well as the Orient, had their enthusiasts for the hawking-sport. In Aghlabid Ifrīḳiya, the governor Muḥammad II (864–75), called not without reason the "Cranesman" (Abu 'l-Gharānīḳ), exhausted the state exchequer with his wild expenses on the "flying-play" (*laʿb*). Later the Ḥafṣids, too, were smitten by hawking. Like a Sāsānid prince, Al-Mustanṣir (1249–77) found his pleasure, with the hawk on his fist, in a vast "preserve" (*maṣyad*) near Bizerta. In the 15th century his descendant ʿUthmān (1435–88) spent several days a week in this entertainment. At the Umayyad court in Cordova, the Grand Falconer (*Ṣāḥib al-bayāzira*) enjoyed a high office, close to the ruler. The fashion of hawking, widespread in the countries of Islam during the Middle Ages, was the livelihood of a great number of people, and its practice was not limited to the privileged classes, as it was in the Christendom. The rural population and the nomads continued to devote themselves to it and preserved the tradition, down to the beginning of the 20th century. From this fact it is easy to evaluate the rôle played by the sporting-bird in Muslim economic life, especially during the medieval period, by the commerce it provoked and the people required for its maintenance.

The traditional classification in the Orient of predatories worthy of training (*ḍarāwa* and *ḍarāʾa*), based on the black or yellow colour of the iris denoting remarkable visual powers, corresponds exactly to the modern ornithological system. In fact the "dark-eyed birds" are found only in the *genus Falco*, "*falconidae*", who alone have a black iris. These are "long-winged sweeping birds, "lured-birds, used to "highflying" (the flight of the heron: *balṣḥūn*, of the crane: *kurkī* or *ghirnīḳ*, of crows: *ghirbān*, from time to time the eagle: *ʿuḳāb*, the kite: *ḥidāʾ*, and the wild water-fowl: *ṭayr al-māʾ*). The Arabist is often puzzled by the abundance of terms designating sporting-birds, such abundance not being due to the multiplicity of types, but to the great variety of adjectives qualifying the innumerable shades of plumage worn by the bird according to its sex, its age and habitat. The Arabs saw several different types when it was only a question of individual birds of the same family, whether immature, young or adult, male or female. One can discover, however, among that accumulation of names the generic term, with the aid on the one hand of scientific inventories of the avifauna of each country, and on the other, of the descriptions provided by the great Muslim naturalists, such as Ḳazwīnī (1203–1283) in his *K. ʿAdjāʾib al-Makhlūḳāt*, al-Damīrī (1341–1405) in his *K. Ḥayāt al-Ḥayawān*, and especially by the authors of cynegetic works.

Thus the *ṣaḳḳār*, falconer, was occupied in training only: a) the Ger-Falcon, *Falco*

rusticolus, (*sunḳūr, shunḳūr, shunḳār*) which, unknown in the Arab countries, had to be imported at great expense from Siberia, and which often figured among the ceremonial gifts upon an exchange of ambassadors; b) the Saker Falcon, *Falco cherrug*, (*ṣaḳr, ṣaḳr al-ghazāl, shark*); c) the Peregrine Falcon, *Falco peregrinus*, under its three oriental sub-species: *perigrinator, babylonicus* and *calidus* (either *shāhīn* or *baḥrī* for the "Passage-Peregrine"); d) the Blackwinged Kite, *Elanus caeruleus* (*zurraḳ, ṣaḳr abyaḍ*, and Pers. *kūhī*); e) the Merlin, *Falco columbarius aesalon* (*yuʾyuʾ, djalam*); f) the Hobby, *Falco subbuteo* (*kawindj*); g) the Kestrel, *Falco tinnunculus* (*ʿāsūḳ*); h) the Lesser Kestrel, *Falco Naumanni* (*ʿuwaysiḳ*); i) the Red-footed Falcon, *Falco vespertinus* (*luzayḳ*).

In the Muslim West highflight hawking knew only four *falconidae*: the Saker (*nublī* or *lublī*, derived from the name of the Andalusian town Niebla, which points to a loanword); the Barbary Lanner Falcon, or the "Alphanet" of the Christian falconers, *Falco biarmicus* (*burnī*); the Barbary Falcon, *Falco peregrinus pelegrinoides* (*turklī*); and Eleanora's Falcon, *Falco eleonorae* (*baḥrī*). These four falcons are described in the Maghrib as "noble" (*ḥurr*). As for the "yellow-eyed birds", raised only by the *bāzyār*, ostringer, they are the class most used in the hawking-sport. They are all "short-winged soaring birds" or "fist-hawks" trained for "lowflying". This category is composed largely of the genus *Accipiter* or *accipitridae* and includes in some parts of Persia and Turkey the smaller *aquilidae*.

The bird which has enjoyed the greatest favour since remote antiquity and in every country of the Orient is undoubtedly the Goshawk, *Accipiter gentilis*, and its subspecies *Accip. albidus* (either *bāz*, or *shāhbāz*) which, because they do not belong to the avifauna of the Arabic countries, were imported by merchants from Greece, Turkestan, Persia and India; the Maghrib scarcely knew of them. It was believed that the Goshawk was born to the flying art. Its Persian name *bāz*, passed into Arabic before Islam, was applied apparently through ignorance to every sporting bird, and the term *bayzara*, ostring art for the experts, meant hawking in general. Conversely, it was "falcon" which prevailed over "goshawk" in Europe, and "falconry" covered the technique of the ostring art. […]

As for eagles, they never have had in fact the rank of sporting-birds (*ʿitāḳ al-ṭayr*); however, Persians and Turks trained with success the Crested Hawk Eagle, *Spizaetus cirrhatus* (*tughrūl*), Bonelli's Eagle, *Hieraetus fasciatus*, and the Booted Eagle, *Hieraetus pennatus* (both called *zummādj*). The Harriers (*murzāt*) and Buzzards (*saḳāwā*) were neglected owing to their untamable ferocity; the kite and the vulture (*nasr*) as well, because of their taste for carrion. The Persians carried the art of training as far as the Eagle Owl (*būha*) which served to attract the other predatories. All of the "yellow-eyed birds" were earmarked for the lowflying at the quail (*sumānā, salwā*), the partridge (*ḥadjal*), the Chukar partridge (*ḳabdj*) and the See-See (*ṭayhūdj*), the sandgrouse (*ḳaṭā*), the Bustard (*ḥubārā*), the Little Bustard (*raʿʿād*), the Francolin (*durrādj*), the Ruddy Shieldrake (*ʿanḳūd*) and other game-birds of the steppe and desert.

The techniques proper to *bayzara* were early in Islam the objects of numerous treatises which, for the most part, have not survived; Ibn Nadīm mentions ten of them in his *Fihrist*. On the other hand a large number of the manuscripts in the public and private libraries in Europe and the Orient have yet to be studied. Nevertheless these techniques are comparatively well known to us thanks to several works already edited. The oldest of these texts, treating falconry, might be the basis of the

Latin-Roman versions not yet identified but attributed to the two authors Moamin and Ghatrif. The Syrian Kurd ʿAlī had the happy idea of publishing (Damascus 1953) a treatise *Al-Bayzara* devoted to the falconry of the Fāṭimid caliph Al-ʿAzīz bi-llāh (975–96); the anonymous author offers us the profit of his own long experience and that of the specialists in hawking (*luʿʿāb*) in a style stripped of extraneous erudition: poetical citations are arranged in a special chapter. This work is by far the most valuable of those we possess in Arabic on the training methods. At almost the same time Asʿad Ṭalas edited (Baghdād 1954) the oldest known Arabic text, *K. al-Maṣāyid wa 'l-Maṭārid*, the work of the famous poet Al- Kushādjim (d. 961 or 971). This complete treatise on venery and falconry was one of the sources most exploited by later authors of cynegetic works; there emanates from it unfortunately too great a preoccupation with *adab* which relieves it of any practical significance. Very different and far more lively and useful are the "hawking-sport memories" of Usāma Ibn Munḳidh (d. 1188) in his *K. al-Iʿtibār* composed during the period of the Crusades […]

From the time of the Prophet the question has been posed, with regard to Ḳurʾānic law, of the legality of eating a game-bird caught by means of a trained (hawk) predatory; it was a question of whether the bird ought to be slaughtered in accordance with the rites. Averroes, in his *Bidāyat al-Mudjtahid*…, gives a clear account of the different positions adopted by each of the four schools of law. This same question constitutes the introductory part of all of the works dealing with falconry and venery.

(F. Viré)

5. Miscellanea from the World of Fauna

Hare

Grammatically the Arabic noun *arnab* (pl. *arānib*) is feminine and denotes the hare, with the general meaning of a leporid, either as a collective noun, or specifically the doe-hare. In all the Arabic dialects the term maintains this meaning, but in Maghribī two plural forms are found, *rawānib* and *arnānib*. Today its archaic synonym *ḳuwāʿ* (fem. *ḳuwāʿa*) seems to have been forgotten. Arabic lexicographers relate *arnab* to a root *r-n-b* according to the rules of triliteralism, but its etymology should perhaps be sought in Sumerian or Akkadian, from which a number of animal and bird names in Arabic are derived (like *dhiʾb, ghurāb, iwazz, kurkī* etc.). Semantic equivalents to *arnab* are *khargūsh* in Persian, *tawsan* in Turkish, *awtul* (pl. *iwtal*, fem. *tawtult*, pl. *tiwtalin*) in Berber of the Maghrib, *emerwel* (pl. *imerwelen*, fem. *temerwelt*, pl. *timerwelīn*) from the verb *erwel*, "to flee", in Tamaḥaḳ, while *abekni* (pl. *ibekniten*, fem. *tabeknit*, pl. *tibeknītīn*) is little used.

Among the order of lagomorphs and the family of leporids, the genus *lepus* is represented in Islamic lands predominantly by the *lepus capensis* or Cape hare. Its breeding ground stretches from Africa (Cape of Good Hope) to China (Shantung, bordering on the Yellow Sea of Asia). In the Mediterranean zone it is found with the plains species, *l. granatensis* (Spain), *l. schlumbergeri* and *l. sherif* (Morocco), *l. mediterraneus* and *l. kabylicus* (Algeria) *l. tunetae* (Tunisia) and *l. rotschildi* (Egypt); in western Morocco the smaller *l. atlanticus* is also found. In the hills are found *l. marocanus* and *l. pediaeus* (Morocco) and *l. sefranus* (Algeria). The characteristically desert

hare, *l. arabicus*, is found on the borders of the Sahara, together with *l. pallidior, l. harterti* and *l. barcaeus*, from Morocco to the Sinai peninsula. A systematic study of the hares of the Arabian Peninsula has yet to be made. The species *l. europaeus* is represented in the Near East in several isolated places as well as *l. syriacus* (Lebanon) and *l. judeae* (Palestine).

Literary authorities differ about the gender of the noun *arnab*; some see it as masculine with an associated feminine *arnaba*, but country people, both sedentary and nomadic, knew from very early times how to distinguish the sex and age of hares by a specific terminology which is unambiguous. The male, or buck, was called *khuzaz* (pl. *khizzān, akhizza*) or *ḥawshab* or *ḳuffa* (Maghribī *ʿakrūsh*). The female, or doe, was named *ʿikrisha* (Saʿūdī, *ʿidana*); while suckling she was called *djaḥmarish*. The levret was called *khirniḳ* (pl. *kharāniḳ*) or the *khawtaʿ*, and the weanling *suḥla* (Maghribī *kharbūsh, ḥarbūsh*; Tamaḥaḳ *eberḍewel*, pl. *iberḍewēlen*, fem. *teberḍewelt*, pl. *tiberḍewēlīn*). From an ethnological point of view, these country folk knew the habits of the hare in detail and its simple form or lair (*makā/makʾ/makw*, pl. *amkāʾ, khitl*, Maghribī, *margad*) did not escape the eyes of the herdsmen; it was found facing the prevailing wind behind a tuft of grass. Regions where hares were plentiful were named *muʾarniba/murniba* or *makhazza* or *mukharniḳa*, according to whether adults or young hares were predominant. Most of the Bedouin observations about the leporids have been recorded by the naturalists al-Ḳazwīnī (*ʿAdjāʾib al-makhlūḳāt*), al-Damīrī (*Ḥayāt al-ḥayawān al-kubrā*) and especially al-Djāḥiẓ (*Ḥayawān*). From these records scholars can learn that the hare has hair inside its cheeks, that it dozes with its eyes wide open, and that it is always on the alert and flees at the slightest danger, which has gained it a universal reputation as a coward. The doe, like a bitch or she-ass, menstruates from time to time and because of this impurity in the family of leporids, the species was not mounted by the djinn. The passion of the rut linked with the phenomenon of superfoetation in fertilising the doe led to a popular belief in the hare changing sex annually. In antiquity, it was also considered to be a case of hermaphroditism.

The hare is certainly one of the most highly-prized game animals in Muslim countries, as elsewhere. To catch it, man has employed all kinds of ingenuity; he has caught it with nets (*ḥibāla*, pl. *ḥabāyil*), snares (*sharak*, pl. *ashrāk*) and traps (*mighwāt*, pl. *maghāwī; mughawwāt*, pl. *mughawwayāt; ḥuḳna*, pl. *ḥuḳan*), and he has hunted (*ṭarada*) with the help of trained beasts (*ḍawārī*) like the gazehound (*salūḳī salūḳī*, pl. *-iyya*), which always hunts by sight, and pointers or other hounds (*zaghārī*, pl. *-iyya*, Maghribī *ṭārūs*, pl. *ṭawāris*) which hunt by scent. The Persian lynx (*ʿanāḳ al-arḍ*) and trained birds of prey (*djawāriḥ*) are also used. He has used various weapons to attack the hare like the thrown cudgel (*hirāwa, zarrīṭa/zarwāṭa*), which the young shepherds of the plains of the Maghrib can wield so skilfully, as well as the sling (*mikhdhafa, miḳlāʿ*), the bow, then the crossbow and eventually firearms. As well as man, the hare is surrounded by a number of natural enemies, carnivores and rapacious predators; it is especially threatened by the tawny eagle (*aquila rapax*) which is appropriately called *ʿuḳāb al-arnab* or *ṣaḳr al-arnab*. Hare flesh has no fat or tendons, owing to the alimentary eclecticism of the animal. It is instinctively attracted to certain aromatic and sweet plants, and the Bedouin expression *arnab al-khulla*, "the hare of the sweet plants" summarises the appreciation of the gourmet and the glutton (*Ḥayawān*, iv, 134). The gastronomic authority Abu 'l-Wadjīh al-ʿUklī, a

man of the desert and one of the informants of al-Djāḥiẓ, gave pride of place to the hare in the metaphor "If the uromastix-lizard (*ḍabb*) had been a chicken, the hare would be a francolin (*durrādj*)". Oriental cookery books esteem hare highly in their chapters on meats. To serve jugged hare (*arnabī*) or roast saddle of hare (*ʿadjz mashwī*) to a guest was a mark of honour, especially if one kept the kidneys for him; these were regarded as the finest morsel, as can be seen from the pituresque maxim *aṭʿim akhā-ka min kulyat al-arnab* "feed your brother with hare's kidneys", which meant using the tenderest words to console a friend in difficulty.

Al-Djāḥiẓ draws attention to the double benefit which the hare provides. Apart from its highly desirable flesh, its fine warm pelt also has a commercial value in the fur trade and the textile industry. An anonymous satirical line of verse alludes to the trade in these terms: "When gentle folk move (among them), it is to see them touching hare skins with their hands wide open". The sentence expresses the scorn which has always attached to rabbit skin dealers. Rabbit skin is not distinguished from hare skin in the making of fabrics called *muʾarnab/murnab* and certain felts. The fur is also used to line gloves and slippers and to trim winter bonnets. It is not inconceivable that they were also used as counterfeit furs, which would normally be more highly priced, but the secrets of dyeing and other treatments were known only to the tricksters. The colour of the fur can vary from light brown almost to blonde according to the hare's habitat, and certain beige materials are called *marnabānī* "hare coloured"; conversely, in popular French the hare is known as "capuchin" because of the brown habit worn by the monks of that order. The hare's tail is black on top and immaculately white underneath; it is conspicuous even from a distance because the tuft is always erect. The Saharans have a name (*a*) *bū nawwāra*, "the one with the flower" which is used for the hare as well as for the fox.

As Islam expanded westwards to Spain and north-eastwards to the Indus, Arabs were introduced to a second leporid, the rabbit (*Oryctolagus cuniculus*), both wild and domestic. Since there was no specific term for rabbit in the *ʿarabiyya*, *arnab* was used. At first they regarded the wild rabbit simply as a small hare, and it was sometimes called "levret" (*khirnik*). The duality of the term *arnab* in the East to cover hare and rabbit is a source of constant confusion, but one of the first to find difficulty with it was Ibn al-Muḳaffaʿ. When he was translating the fables of Bidpay from Pahlavi, he encountered the typically Indian episode of the elephants who were looking for water and trampled over a rabbit warren (*arḍ li 'l-arānib*), crushing the inhabitants in their burrows (*djuḥr*, pl. *adjḥār, adjḥira, djaḥara*), but the clever rabbit Fayrūz (= Felix) became their spokesman and drove away the elephants by a trick. This story could not possibly be concerned with hares, for they do not live in colonies and they do not tunnel underground. Once the domestic rabbit was being bred on a large scale, it became necessary to add epithets to *arnab* to make the word more specific; *arnab barriyya* or *waḥshiyya* was used for the hare, and *arnab ahliyya* or *dādjina* or *baladiyya* for the domestic rabbit, but the wild rabbit hardly had any specific name. In the Muslim West the same confusion did not arise, because in Spain as well as in the Maghrib the wild and domestic rabbit kept its original Latin name *cuniculus* in Arabised form (compare Fr. *connil* or *connin*, Provençal *couniéu*, Sp. *conèjo*, Port. *coélbo*, It. *coniglio*, Eng. *cony*, Ger. *Kaninchen*, Swed. *kouin*). The Hispano-Arabic names *kunilya/ḳunilya, ḳullīn, ḳulayn* are still found

in the Maghrib as *ḳanīn/ganīn* (sing. *-a*, pl. *-āt* and *ḳnāyen/gnāyen*), *ḳalīn* (pl. *ḳlāyen*), *ḳūnīn/gūnīn*, *ganūn* and Kabyle *agunin* (pl. *iguninen*). Besides *arnab*, Hispanic languages use *labbay* (pl. *-āt*), ultimately derived from Ibero-Roman *lapparo* (from *leporis*, Sp. *liebre*, Catalan *llèbre*, Prov. *lèbre*, Fr. *lièvre/lapereau/lapin*).

According to Ḳur'ānic law, the flesh of a hare which has had its throat cut ritually may be consumed; the doctors of law agree unanimously about this, for the hare is a product of hunting and the animal is herbivorous and not carnivorous. It is true that some *ḥadīths* suggest that the Prophet Muḥammad abstained from eating hare, but no-one accepts this as a formal prohibition. This permission extended *ipso facto* also to the rabbit when the animal was introduced to Muslims. In al-Andalus, the rabbit was highly prized and the only restriction imposed on it was that it should not be sold around the Great Mosque. Instead, a place was chosen by the *muḥtasib* and there they had to be offered for sale properly slaughtered and skinned so that the meat could be seen to be fresh.

In Greek medicine a number of specific virtues were accorded to particular organs of the hare. The flesh was thought to have laxative and aphrodisiac properties. Later Arab medicine confirmed the views of Hippocrates and Galen on this subject, but added some new empirical prescriptions. Perhaps the most important parts were the brain and the gastric juices (*infaḥa*); the brain was the best remedy for trembling and senility, and it could be applied to an infant's gums to suppress the pain in teething, but if it was mixed with camphor and drunk it was thought to be an infallible love philtre. The gastric juices and stomach tissue were mixed into a potion with a vinegar base and used as an antidote for all kinds of poison. It is interesting that modern science, whether by chance or not, knows no proven remedy which has any real chance of fighting the poison of the phalloïdine (death's cap) fungus other than the absorption of a mixture of minced brains and stomachs of leporids. Perhaps after all, Arab empirical medicine was not just pure fancy. Dried and powdered hare's blood had recognised healing qualities for sores and wounds and helped to extract foreign bodies like splinters and thorns; it was also used to treat arrow wounds. In surgery, leporid hair was used instead of cotton wool as an absorbent tampon and as a cap for ruptured veins and arteries.

(F. Viré)

Crocodile

The Arabic *timsāḥ* (pl. *tamāsīḥ*) is the masculine substantive denoting the Nile crocodile (*Crocodilus vulgaris*) of the class of reptiles (*zaḥḥāfāt*) and the order of saurians (*ʿazāliyyāt*); it is the only crocodile known in the Arabophone countries. The name appears to be derived from the Coptic *ϣimsaḥ*.

According to ancient authors, this crocodile is said to have been formerly present in the waters of the Jordan and the Euphrates. A carnivore, it devours all kinds of meat and fish. Of naturalists writing in the Arabic language, al-Damīrī is the only one to have dealt at length with the crocodile; he mentions all of its particular features, most of his information being borrowed from Aristotle.

In Islamic law, the consumption of the flesh of the crocodile is formally prohibited, the animal being a carnivore.

On the other hand, this saurian presents several specific qualities. Thus one of its eyes worn by a rheumy-eyed person

(*ramad*) cures him rapidly, whether this be the left eye for the left or the right for the right. To carry one of its teeth about one's person has an aphrodisiac effect and, if it is from the left side, it dispels any kind of shivers (*ḳashaʿrīr*). Its fat is a beneficial ointment for treating otitis and its gall makes an effective eye-wash for the treatment of albugo. When dried, pulverised and used in fumigation, its liver alleviates epilepsy (*ṣarʿ*) and its dung, extracted from the intestine and applied as a lotion to the affected skin of the leper (*bayāḍ*), makes the disease disappear. In spite of all this, the crocodile remains, in the opinion of most, an exceedingly harmful beast, as is shown by expressions such as *aẓlam min timsāḥ* "more tyrannical than a crocodile".

(F. VIRÉ)

Fox

The Arabic *thalab* is a masculine substantive (pls. *thaʿālib*, *thaʿāl* [in]) denoting the fox (*Vulpes vulpes*), carnivore of the canine tribe, belonging to the class of Canidae and the family of Vulpinae; in Persian *wāwi*, *rūbāh*, and in Turkish *tilki*. The vixen is called *thaʿlaba*, *thuʿala*, *thurmula*, *thuʿlubān* and the fox-cub is *hidjris* and *tanfal*. Furthermore, the fox bears the nicknames of *Abu ʾl-Ḥusayn*, *Abu ʾl-Nadjm*, *Abu ʾl-Nawfal*, *Abu ʾl-Wathab*, and *Abū Ḥinbis*, while the vixen is *Umm ʿUwayl*.

The guile which is the dominant feature of the fox is acknowledged by the expressions *amkar min thaʿlab* "more cunning than a fox". According to al-Damīrī, the fox has certain properties which counterbalance its reputation. The quality of its pelt has always made it a highly-prized item of clothing, supplying both warmth and elegance. Its head, placed in a dovecote, drives away all the pigeons. One of its fangs, fastened to an infant, suppresses the pain of teething; applied to an epileptic it brings rapid relief, as does the gall when dried, pulverised and inhaled through the nostrils. Its flesh is beneficent in the treatment of elephantiasis (*djudhām*), although Islamic law prohibits its consumption. Its fat is a useful ointment in the treatment of gout (*niḳris*) and otitis (*iltihāb al-udhun*). One of its testicles, hung on an infant, has the same effect as its fang in soothing teething pain. One of its ears, when applied to a neck affected by scrofula (*khanāzīr*), suppresses them rapidly. Its testicles, pulverised and dissolved in boiling liquid, have an aphrodisiac property; its excrement, applied to the penis in the form of a lotion, has the same effect. The blood of the fox, smeared on an infant's head, causes the hair to grow, even if the child has scabies (*djarab*). Finally, holding its testicles in the hand dispels all fear of dogs.

(F. VIRÉ)

Ostrich

Naʿām (A., singular *-a*, pl. *-āt*, *naʿāʾim*) is a collective noun designating the ostrich (*Struthio camelus*) without any distinction of sex.

The only representative of the family of struthionids, of the sub-class of ratities or runners, the ostrich, sometimes called "ostrich-camel" (Greek στρουθοκάμηλος, Persian *ushturmurgh* "camel-bird", Turkish *devekushu* "camel-bird"), at present lives only in equatorial and southern Africa, although some were still alive in the deserts of Syria, ʿIrāḳ and Arabia until the first quarter of our century; it is said that it was from the most ancient times familiar to the Arab nomads of these countries, as it was to the Berber

tribes of the Maghrib and to the Touareg (in Tamasheḳ, *enhel* pl. *inhal*, fem. *tanhelt* pl. *tinhal*). In Mesopotamia, where the sub-species *Str. cam. syriacus* was known, the Sumero-Akkadian tablets mention it generally (Sumerian *gha-shir-mushen*, Akkadian *lurmu*). The Bedouins had the leisure to observe in detail this large biped with the silhouette of a camel, and its inability to fly caused it not to be regarded as a bird but as a near neighbour of the camel family. An abundant terminology (some fifty adjectives) defined, among the people of the desert, the external characteristics, bearing and habits of the ostrich whose plumage, meat and eggs were quite sought after; fixed by the poets of the tribes, this linguistic baggage was preserved in the works of the Arabic-speaking lexicographers, encyclopaedists and naturalists. The sexual dimorphism of the ostrich was much noted by numerous epithets applied to each sex according to its characteristics. The male (*salḳaʿ*), larger and stronger than the female, is commonly called *ẓalīm* (pl. *ẓulmān, zilmān, azlima*) "oppressed", for, according to the Bedouin fable, his ears were cut short when he was attempting to have horns; despite such an explanation, it seems that one should see in *ẓalīm* an intensive with the meaning of "very dark", an attribute of its plumage, similarly as with its other adjectives *asḥam* and *ghayhab*. As it takes its turn sitting on the eggs, as well as the three or four females of its harem, it is surnamed *abu 'l-bayḍ* "father of the eggs and *abū thalāthīn* "father of thirty [eggs]", as a parallel to the sitting hen, who is *umm al-bayḍ* and *umm thalāthīn* "mother of the eggs", "mother of thirty [eggs]". In the mating season, the male becomes *khāḍib* "red-thighed", for the skin of his thighs and his beak takes on a coral hue; the female always remains *ramdāʾ* or *rabdāʾ* "grey" or *hird* "yellowish" due to her ashen plumage, whereas the male is *akhraḍj* "mottled black and white" and *akhṣaf* (same meaning). One of the most striking characteristics of the ostrich's anatomy is its long, thin and bare neck, which earned it the names *hayḳ, hayḳam, ṣaʿl, akhḍaʿ, asḳaf, asṭaʿ, ʿaslaḳ* and, for the female, *khayṭāʾ*; a group of ostriches also used to be called *banāt al-hayḳ* "long-necked ones". The smallness of the flat head with the sparse, wiry hair of the ostrich and the hardness of its skull were also described by the words *ṣuntuʿ* and *ṣiʿwann*, while it is called *aḍḍjam* due to its strong beak, elongated like the muzzle of a camel and often slightly curved. The absence of an external ear, common to all birds, led the Bedouins to believe that the ostrich did not have ears and was consequently *maṣlūm, muṣallam*, and totally lacking in the sense of hearing (*asakk*); it supplemented this, according to them, with its faculty of sight and a very subtle sense of smell, hence the simile *ashamm min al-naʿāma* "with a better sense of smell than the ostrich". As a means of defence and safeguard, the ostrich only has at its disposal the rapidity of its flight (*zaḍjaḍj*), always with its face to the wind, being able to equal the swiftness of a horse spurred into a triple gallop.

In the mating season, the male ostrich, like the camel, has a high-pitched voice (*haḍjhāḍj*), making different raucous sounds with its complex shrill cry (*naḳʿ*), when it is frightened. Despite being oviparous (*ḍahūl*), the female ostrich does not make a nest; she is content to scratch and flatten in the sand a shallow hole (*udḥī, idhī, udḥuwwa, udḥiyya, madḥā, balad*) which is sufficient to accommodate her clutch (*tūm*) of six to eight eggs in general. As several females of the same male pool their eggs in the same breeding place for security and to make it easier to sit on them, the Bedouins used to attribute this behaviour to the stupidity (*khurḳ*) of this large bird,

which seemed to desert its own eggs for those of others and which, in the hottest hours, going to forage, left it to the sun's heat to take care of the incubation, when "this simpleton" of a male did not take its turn; for them, one could not be *aḥmaḳ min naʿāma* "stupider than an ostrich" or *ashrad min naʿāma* "more cowardly than an ostrich" or *adhall min bayḍat al-balad* "viler than the egg [of an ostrich abandoned] in the sand". Besides, to the credulous and superstitious spirit of the nomads, the ostrich was the mount of the demon ogre (*ghūl*) of the desert, the terror of travellers. Added to these beliefs is the tale according to which the hunted ostrich believes that it screens itself entirely from the view of its pursuer by hiding only its head behind some rugged ground.

As game, the meat of the ostrich is recognised, in Islamic law, as being licit consumption, but it does not seem, according to the authors, that the Arabs appreciated it as much as that of the large, wild quadrupeds. As for the Maghrib, al-ʿUmarī (8th/14th century) and then Leo Africanus (9th/15th century) report that the population of Constantine freely captured young ostriches in large numbers in order to fatten them and put them on the spit. Among the Touaregs, the nobles abstained from eating the meat of the ostrich, but the *imghad* and slaves were fond of it, as were the sedentary people of the towns of the Sudan who bought it from the nomads. In the 10th/16th century, al-Maḥallī further mentions in his *Tuhfat al-mulūk* the abundance of ostriches and their eggs between Fās and Tlemcen. This remark confirms the interest shown, even from the prehistoric period, in ostrich eggs. The deposits in the sand of collective clutches, which could reach thirty eggs and more, were assiduously visited; a single egg constituted a substantial dish for several people, its weight equivalent to two dozen hens' eggs. To outwit the distrust of the sitting birds, the collector would content himself with lifting one or two eggs at a time, at the time when they were going to forage. The empty shells (*tarīḳa*, pl. *tarāʾik*) after the hatching of the chicks and those that were emptied (*ḳayḍ*) for the consumption of their contents, were carefully recovered and fashioned to serve many uses (receptacles, oil lamps, braising pans, etc.). Introduced in the mosques at first as a decorative element, these shells became the subject, in the late Middle Ages, of an export trade to the Christian countries. The early Church had made the egg a symbol of the Resurrection, and each religious building was set on possessing among its treasures one of these enormous and uncommon ostrich eggs, often mounted in an art object and set with precious metals; the first that arrived in Western Europe were taken, in the naive popular imagination, for those of the fabulous gryphon.

In the East, ancient therapeutic lore accorded specific properties to certain anatomical parts of the ostrich; Ḳazwīnī and al-Damīrī mention some of them to us. It is known that the gall, considered to be a violent poison, became an efficacious antidote for every other mortal poison, and, prepared as an eye lotion, constituted a beneficial remedy for blindness. On the other hand, the marrow of the long bones could, by absorption, cure consumption. The melted fat, used as an unguent, reabsorbed tumours, while the dung (*sawm*) burnt and ground into powder healed ulcers. The roasted meat facilitated the elimination of wind, bad mixtures of humours, warts and itching. Some fragments of ostrich egg shell thrown into the water of a cooking pot on a fire had, it seemed, the property of accelerating boiling considerably. Even more extraordinary, indeed magical, was

the fact that the blade of a sword or dagger made of iron, having stayed in the ostrich's gizzard, was unalterable and unbreakable. Finally, a scrap of ostrich skin cut in the shape of a fish floated as soon as it was plunged into a bottle of vinegar. Until quite recent times, the people of the Sahara held in high esteem the marrow of the ostrich bone for, inserted into the ear afflicted with deafness, it would restore hearing to it. Likewise, melted ostrich fat, a sovereign remedy against rheumatism, was also sold in Agadès by the litre in the last century; it was used, moreover, in the composition of cosmetics for women and served, in cooking, for frying. The extremely resistant tendons of the ostrich provided an excellent thread for shoemaking, for strong bow strings and for staunch binding cords. The ostrich skins plucked of their feathers were tanned to make saddlebags and ornaments of harnesses.

(F. Viré)

Ants

Naml (Ar.) is a substantive of a collective nature (unitary noun *namla*, pl. *nimāl, namul, numul*) denoting ants (Persian *namal, mūr*, Turkish *karınca*, Tamaḥaḳ *anellugh*, pl, *inellughen*, Hebrew *nemālah*, pl. *namālim*. These hymenopters living in organised societies comprise more than 1,600 species worldwide, and are divided into two groups: "formicines" (genera *formica, camponotus, lasius*) which do not possess an aggressive sting, and "myrimicines" (genera *myrmica, tetramorium, aphenogaster*) which are thus equipped. These classifications being of interest only to specialist entomologists, the majority of laymen, in the Arab and Berber world as elsewhere, differentiate between the numerous species of ant only according to the external criteria of size, colour and behaviour. For the city-dweller as for the nomad, there are only large or small ants (*dharr, dabā* [n]) or, in addition, those which sting or bite and the harmless ones, although certain of the latter are capable of spitting a corrosive liquid, formic acid (*ḥamḍ al-naml*), causing severe burns. Similarly, attention is often paid only to the colour, with black ants on the one hand and yellow-red ants on the other. Arabophone naturalists of the Middle Ages such as Ḳazwīnī, al-Djāḥiẓ and al-Damīrī, reproducing the statements of Aristotle, Pliny the Elder and Aelianus, added nothing to these forms of distinction. Their only contribution was to supply the nicknames (*kunya*) given to ants in local dialects including, for the male, *abū mashghūl* and, for the female, *umm tawba* and umm *māzin*.

Since early Antiquity, ants have been an object of admiration on account of their prescience, the feverish activity with which they provide for their sustenance and the perfect organisation of their societies. The Bible refers to them as an example (Proverbs, vi. 6–8, xxx. 24–5). With the arrival of Islam, Muslims were obliged to consider them a privileged "race" (*umma*), since the Ḳurʾān, in the sūra *al-Naml* (XXVII, l8), recalls the legend attributed to Solomon who, arriving with his army in the "Valley of the Ants" (*Wādī 'l-naml*) in Syria, is supposed to have heard the sentinel of the local population calling to his companions to return with all possible speed to the ant-hill (*ḳaryat al-naml, djurthūma, manmala*) to avoid being trampled underfoot by the soldiers. Solomon smiled, seeing here a direct message from the Most High who had granted him the supernatural gift of understanding the language of animal and, in particular, that of the birds. In corroboration of this divine protection enjoyed by ants, a *ḥadīth* of the Prophet Muḥammad prohibits the

killing of the following four animal species: the ant, the bee, the hoopoe (*hudhud*) and the shrike (*ṣurad*). However the exegetes of the four judicial schools of Islamic orthodoxy permit the destruction of small ants (*dharr*) when they intrude upon the human domain and attack foodstuffs, causing significant damage in homes, shops and gardens or when they display aggression with stings and bites; the only means of repression formally prohibited is the use of fire. Al-Damīrī suggests a number of conjuratory talismanic formulas for inducing ants to abandon the places that they have invaded (*manmūl, arḍ namila*); these formulas are similar to those used for repelling grasshoppers. The same author also describes certain practical and effective measures for being rid of unwelcome ants; these include smothering the ant-hill with cow-dung or depositing there the excrement of a cat. If extermination is the object, it is sufficient to place on the site a piece of calamite or "Lover's stone" (*ḥadjar al-maghnāṭīs*) or to sprinkle it with ground carraway (*karāwiyā*) or cumin (*kammūn*) or to spray with rue-water (*sadhāb*) or tar-water (*ḳiṭrān*) or to grind sulphur (*kibrīt*) in the vicinity. Finally, ants will not approach an object on which the stained linen of a menstruating woman has been placed.

According to Ḳurʾānic law, the consumption of ants is absolutely forbidden, as is the consumption of the cocoons or false "eggs" (*bayḍ, maʾzin, māzin, ḥawrāʾ, ḥawriyya, ʿadhrāʾ*) and of the foodstuffs (*zibāl, zubāl*) which the workers transport with their mandibles and their feet.

The "specific qualities" (*khawāṣṣ*) attributed to ants tend to be negative. Thus the cocoons, if ground to a powder and applied to the skin, prevent any growth of hair. In order to disperse and put to flight a group of persons, it is enough to throw at them a few of these cocoons; a concoction of these taken in the dose of a single *dirham* entails severe intestinal disorders. Finally, an ointment composed of seven large ants soaked for a day and a night in a solution of calomel (*duhn al-zi'baḳ*) and smeared on the sexual organs is reckoned to be a powerful aphrodisiac. In oneiromancy, to see ants arriving in one's house with their stocks of provisions is an omen of prosperity, while seeing them leave presages misfortune. An invalid who dreams of ants covering his body is sure to die.

The feverish activity and small size of ants have given rise in Arabic to a number of adages in the form of analogies; examples include *aḥraṣ min al-naml* "more greedy than the ants", *aḍʿaf wa-akthar wa-aḳwā min al-naml*, "more feeble, more prolific and more vigorous than the ants", *arwā min al-naml* "more prescient than the ants", *alṭaf min dharra* "more slender than a small ant, *ashamm min dharra* "having more flair than a small ant", *aḍbaṭ min namla* "more tenacious than an ant".

(F. VIRÉ)

Locusts

The Arabic word *djarād* (locusts) is a collective noun, the nom. unit. being *djarāda*, which is applied to the male and the female alike. No cognate synonym seems to exist in the other Semitic languages. For the different stages of the locust's development the Arabic language possesses special names (such as *sirwa, dabā, ghawghāʾ, khayfān*, etc.) which, however, are variously defined by different authorities.

Being found in abundance in the homeland of the Arabs, locusts were often mentioned and described in ancient Arabic poetry and proverbs. In the Ḳurʾān

they figure in the enumeration of the Plagues of Egypt (VII, 133) and in a simile describing the resurrected on the day of judgement (LIV, 7). According to some *ḥadīṯs* they are lawful as human food.

In Arabic zoological, pharmacological and lexicological works numerous kinds are mentioned, part of which, according to some authors, differ in colour (green, red, tawny [*aṣfar*], white). Where it is stated that the male is tawny and the female black, a specific variety is obviously spoken of. Some locusts fly and some leap. Some have a big and some a small body. They have no fixed habitat but wander about from place to place following a leader. The males have a lighter body and therefore are better able to fly. Locusts have six feet, the tips of which (or: the tips of the two hindlegs) are like saws. Their eyes are immobile. Next to fish they lay the largest number of eggs of all oviparous animals. The young hatch in less than a week. Several authors state that, for laying eggs, the female seeks rocky ground which cannot be broken even with sharp tools, strikes that ground with her tail (ovipositor) and thus makes a crevice into which she lays the eggs. Other sources give a different and more detailed description: In spring, the females seek out good, soft soil, dig holes with their tails, in which they conceal the eggs, fly away and perish of cold or are killed by birds; in spring of the following year, these buried eggs open, the young hatch, feed on all they can find and, when they are big, fly to another country where they in their turn lay eggs. Locusts eat dung and the young of hornets and of similar animals; they themselves are eaten by sparrows, crows, snakes and scorpions. No animal causes greater harm to the means of human sustenance since they eat all that they come across. Their saliva is a deadly poison to plants. Some devices to keep them away from crops are mentioned in the sources.

In the opinion of the ancient Arabs, who used to eat them, locusts yield a delicious food tasting like the meat of scorpions; and Djāḥiẓ wondered why certain people did not like it. Yet eating it was believed to cause epilepsy (*ṣarʿ*). Locusts are eaten to this day by the Bedouin.

Medicinal uses of the locust and its significance when occurring in dreams are dealt with in pertinent works.

(L. Kopf)

(ii). The locust, more commonly known as grasshopper, exists in various harmless forms in almost all climatic regions, but in its gregarious destructive form it is particularly and lamentably well-known. Invasions of locusts are a phenomenon not peculiar to the Muslim world, since they occur from China to America and from the U.S.S.R. to South Africa, but almost the entire Muslim world lies within the affected area, and in a region where invasions are especially frequent and severe. There is no need to give an account here of a well-known phenomenon which from the Bible to our own times has been described by many writers. Contemporary biologists have established that in their gregarious forms locusts are the same as in their solitary, peaceful forms: unfavourable climatic conditions simply modify the nature of their reproduction and mode of life. Young locusts then take flight in dense masses numbering millions which darken the sky like a vast cloud; the sound of the rasping of their legs and wings is intensified; when there is a drop in temperature, as for example in the evening, they suddenly settle on the ground and in a few moments every scrap of vegetation is destroyed, sometimes over an area of several square kilometres. As a result the local population suffers an economic catastrophe, except only that the locusts

themselves, if they can be killed, provide some food.

From time to time chronicles mention certain particular invasions of locusts, but generally without giving details, and the information to be gathered from these references is, it seems, too haphazard and localized to allow any deductions to be made in respect of possible modifications in the habits of the locusts, the periodicity of their invasions or the area of their migrations. Today there are several migratory species, the two that chiefly concern us being the Desert Locust (Schistocerca gregaria, mainly in East Africa and Asia) and the Migratory Locust (Locusta migratoria, all other parts of Africa). Attempts have always been made to prevent these invasions; and although modern techniques have to some extent increased the effectiveness of control, they have not in fact introduced any new methods for a long time nor, as yet, have they overcome the scourge. Naturally, the local inhabitants have destroyed the eggs whenever they have found them, as a preventive step. When an invasion takes place, they try to stop the locusts advancing, or to kill them by digging pits, spraying poison, using wheeled screens and flame-throwers etc., (poison and fire already envisaged by Ibn Waḥs̲hiyya) although the destruction inflicted does not prevent terrible damage being done. Resistance can only be successful if immediate notice of the locusts' flight from their outbreak areas is sent, together with details of their route; and it is obvious that particular efforts must be made to discover the places where egg-masses are deposited and to destroy eggs and young on the spot, and perhaps later to make these areas ecologically unsuitable as breeding-grounds. This is what the international organizations are now trying to do, so far without success; and they have suffered from the vicissitudes of African politics, particularly the Organisation Internationale contre le Criquet Migrateur which is chiefly concerned with the breeding grounds on the Niger, and the Anti-Locust Research Centre for East Africa and West Asia, with its headquarters in Nairobi. Partial successes have been gained, for example in South Africa, and it is to be hoped that, so long as the state of international relations does not once again lead to a postponement of effort, it may at last be possible to put an end to one of the strangest and most fearful of the scourges of nature ever known, particularly in the climatic zones inhabited by the Muslim peoples.

(Cl. Cahen)

Lizard

Arabic *ḍabb*, the thorn-tail lizard (*Uromastix spinipes*). Cognate synonyms exist in other Semitic languages.

The animal, found in abundance in the homeland of the Arabs, is often mentioned and described in ancient poetry and proverbs. Much of the information on the animal derives from just these sources which are freely quoted in later zoological works. The *ḍabb* was eaten by the Ancient Arabs who relished it as tasty food; still it is reported that the tribe of Tamīm, who were especially fond of eating it, were ridiculed on that account by other Arabs. In Islamic times, the lawfulness of its use as human food was expressly pointed out by some *ḥadīt̲h* s. Bedouin eat it to the present day.

The *ḍabb* is described as clever but forgetful; it may even not find its way back to its hole, wherefore it chooses a conspicuous place for its habitation. It digs its hole in solid ground—whereby its claws become blunt—lest it collapse under the tread of hoofed animals. It does not brood over the eggs but lays them in a small

cavity of the soil and then covers them with earth. The young hatch after forty days and are able to take care of themselves (autophagous). The *ḍabb* lays seventy eggs and more, which resemble the eggs of the pigeon. Its tail is jointed. It has such great strength in its tail that it can split a snake with it. If it is killed and left for one night and then is brought near a fire, it will move again. It devours its young when hungry and eats its vomit again; yet it is highly capable of enduring hunger, being second, in this respect, only to the snake. It likes eating dates. Its teeth are all of one piece. It is afraid of man but lives on friendly terms with the scorpion, which it takes into its hole as a protection from the human foe. It does not leave its hole in winter. When exposed to the sun, it assumes various colours like the chameleon. It lives seven hundred years and more. When old it foregoes food and is satisfied with air. The male has two penes and the female two vulvae. A certain kind has two tongues. The *ḍabb* drinks little or does not drink at all and voids one drop of urine in every forty days.

Some of the fabulous accounts have their origin in ancient popular tradition, mainly laid down in poetry and proverbs, as pointed out in the zoological works themselves.

Various medicinal properties were ascribed to the heart, spleen, skin, blood, fat and dung of the *ḍabb*. Its significance when seen in dreams has been treated by Damīrī and in special works on that subject.

(L. Kopf)

Pigeon

Ḥamām (Ar. pl. *ḥamāʾim, ḥamāmāt*), a collective substantive which, taken in a wide sense, denotes any bird "which drinks with one gulp and coos" (*kull ṭayr ʿabba wa hadara fa-huwa ḥamām*), that is to say the family of the Columbidae, with which the mediaeval Muslim naturalists incorporated that of the Pteroclidae, the sandgrouse (*ḳaṭā*), morphologically very closely related to the pigeons. The Columbidae, which *ḥamām* represents, are fairly widespread from ʿIrāḳ to the Maghrib with their different species of pigeons and turtle-doves, both resident (*awābid*) and migrant (*ḳawāṭiʿ*).

In the restricted sense, *ḥamām* denotes the domestic pigeons deriving from the rock-dove, whether the free or "roof-pigeons" that are established in towns (*ḥamām ahlī, ḥamām al-amṣār*) and on which the Meccans prided themselves (*ḥamām Makka*), or the artificially bred or "dove-cot" pigeons (*buyūtī, dādjin*) trained to live (*muwaṭṭan*) in private lofts (*ʿamūd*, pl. *aʿmida*) or official pigeon-houses (*burdj*, pl. *burūdj*). It is to this last category that mediaeval writers in Arabic devoted so much of their work in both prose and verse; indeed; the contact established between the Muslims and the pigeon-loving Byzantines gave such a fillip to pigeon-keeping (*laʿb bi 'l-ḥamām*) among the Arabs that it quickly became a pastime that attracted several caliphs, such as the ʿAbbāsids Mahdī, Hārūn al-Rashīd, al-Wāthiḳ and al-Nāṣir.

The theme of the "gentle dove", the messenger of love, peace, and good fortune, was the unfailing inspiration of Arab poets of all periods and in all the Muslim countries, and it would be useless to try to enumerate all the *ḳaṣīdas* which, in their conclusion, evoked the image of eternity in the tender cooing of turtle-doves (*al-hawātif*) high up among tall trees. In Islam, as everywhere else, this bird is regarded with popular affection, and a pair in a cage are very often the chosen companions of the Muslim home; at a very

early date, this affection found expression in various proverbs and legends which hold up the Columbidae as examples of sweetness, attachment and fidelity, as for instance Noah's dove, or the two carrier pigeons sent from Mecca by Allāh to the Prophet Muḥammad when hidden in the cave. It appears, however, that the latter did not share this feeling of affection since, by a tradition which relies on the testimony of Abū Hurayra, he is alleged to have included pigeons among the ranks of the demons. Nevertheless, in the eyes of Ḳurʾānic law the flesh of the columbidae is permitted as food, and mediaeval Muslim medicine credited both it and also pigeon-dung with great therapeutic and aphrodisiac properties; oneiromancy, for its part, allowed great significance to the *ḥamām* seen in a dream, while ornithomancy did the same for the *ḥamām* encountered in the wild.

(F. Viré)

II Food Resources and their Transformation

1. Nourishment and Beverages

Nourishment

Ghidhā (Ar., plur. *aghdhiya*) indicates strictly in Arabic "that which ensures the growth and the good health of the body", in other words feeding and food. We shall deal here only with the factors which determined the diet of the principal Muslim peoples in the classical period (though sometimes making modern comparisons), in particular with the laws of the Muslim religion concerning food. The descriptive section will be limited to the pre-Islamic period. The more particularly culinary aspects, *i.e.*, those concerning the preparation of special dishes, will be dealt with in the article ṭabkh, "cooking". We have omitted for lack of space several aspects of the subject: the variations of food in the contemporary Muslim world, its place in social life (and in particular the question, often dealt with by Muslims, of the *ādāb al-akl*—rules of table manners), the estimated nutritional value in quality and in quantity of the food in the various Islamic countries, etc.

i.—Food of the pre-Islamic Arabs

The food of the inhabitants of the Arabian peninsula (apart from the agricultural and civilized states of the south) was—and in large measure still is today—typical of the diet of a pastoral people in a desert region with scattered cultivated oases. We can get an idea of this food from ancient poetry, the classical texts and the Ḳurʾān. We have examined in addition the *ḥadīth*s, the data of which are acceptable on this matter, since even forgers took great pains to add to the credibility of their work by the archaism of the customs to which they referred.

The essential product from the raising of domestic animals was milk (*laban* rather than *ḥalīb*), one of the two basic foods of the Arabs. The Ḳurʾān (XVI, 68/66) pays an eloquent tribute to this liquid, calling it "sweet to drinkers", and numerous traditions witness how greatly the Bedouin longed for it (*ʿayma*) when they

were deprived of it. Mainly camel's milk was drunk, also that of goats and sheep. It could be drunk diluted with water, but sour milk (*ḥāzir*) was despised. Milk-products from it were: *samn* "clarified butter" which was used for cooking and which disgusted the Romans of Aelius Gallus when they found it used instead of oil in the Ḥiḏjāz; *aḳiṭ* "sour-milk cheese"; *ḏjubn*, cheese of an unknown sort. Camels were slaughtered only in cases of great necessity. In general it was rare for meat to be eaten, but this made it all the more appreciated. They seem to have eaten chiefly mutton, sometimes from sheep kept near the house and specially fattened for the table (*dāḏjin*), of which the Prophet preferred the shoulder and the fore-leg. The Medinans were extremely fond of the fat from its fat tail (*alya*) and of that from the camel's hump, which they cut from the living animal, a practice which Muḥammad forbade. Specially prized parts of the camel were the udder, the liver, the foetus, etc. but the stomach and the tail were the food of slaves. It seems that it was not only in time of famine that they ate blood drawn from the veins of a living camel and allowed to coagulate or put into pieces of gut and cooked. They ate very little beef or goat meat. Pigs and fowls seem to have been scarcely known, although some *ḥadīṯ*s relate that the Prophet ate the latter.

The agriculture of the oases provided mainly dates, another basic food of the Arabs. In the oases they were almost the only food. "When the Prophet died, we were nourished only by the two black things: dates and water" For the inhabitants of the Fertile Crescent, on the other hand, the staple foods, even in the desert, were bread and water. A scarcity of dates is the equivalent of famine. They liked to stress their therapeutic qualities and they formed the stock provisions when setting off on an expedition. They were eaten also at festivals, such as the *walīma* in honour of the marriage of Muḥammad with Ṣafiyya. They were eaten dried (*tamr*), fresh (*ruṭab*)—when they were especially relished (Muḥammad was particularly fond of them eaten with cucumber, *ḳuṯṯāʾ*, or when they were beginning to ripen (*busr*). A special variety called *ʿaḏwa* was particularly sought after (especially those grown in the upper region of Medina) and considered as a sovereign remedy against poisons and sorcery.

Bread may not have been such an aristocratic food as has been thought, for barley bread at least was not uncommon among the settled populations. All the same, the Prophet and his family never ate bread made from wheat flour three days running during the period between the Hiḏjra and his death. The only one of his wedding feasts at which Muḥammad offered his guests bread was that on the occasion of his marriage with Zaynab. The flour was not sifted—Muḥammad had never seen a sieve—but simply blown to separate it from any coarse residue of husks. Among the nomads, however, bread was very rare. Strabo, following Aelius Gallus, speaks of a region of the Ḥiḏjāz where the only cereal is ζειά, perhaps a sort of soft wheat.

Bread was eaten with a "condiment" (*udm, idām*) which was moreover singularly meagre. Those who were able to season their bread with vinegar or oil were not considered as "living on dry bread" and Muḥammad pronounced vinegar the best of condiments. We also hear of his being content with a date as flavouring for a loaf of barley bread. According to a *ḥadīṯ* attributed to ʿAlī, the best accompaniment was meat, the worst salt and the middle place was given to *samn* or oil. But it is possible that some at least of these *ḥadīṯ*s were contaminated by later ascetic trends.

The settled agricultural populations were able to enjoy also some vegetables. Among the *buḳūl*, "herbs", the Prophet preferred *hindibāʾ*, "chicory". He was also fond of beets (*silḳ*) and of some vegetables belonging to the gourd family which are difficult to identify exactly (*dubbāʾ* "a kind of marrow?", *kuṯṯāʾ* "a kind of cucumber", *ḳarʿ* "marrow"). Leeks (*kurrāṯ*) were forbidden, though not *ḥarām*, and so were raw garlic and onions. But according to other traditions, Muḥammad merely expressed his personal dislike of them and forbade those who had recently eaten them to come to the place of prayer. Olives also were eaten (Ḳurʾān, VI, 142/141) and the pith of the palm-tree (*ǧummār*). Fruits mentioned are the citron (*utruǧǧa*), which is thought to be found also (according to the parallel Jewish text and certain Muslim commentaries) in Ḳurʾān, XII, 31 (under the name of *mitk*, *matk*, to be read in place of *muttakaʾ*, or disguised by a corruption in the text), the pomegranate (Ḳurʾān, VI, 99, 142/141; lv, 68), the grape (cf. Ḳurʾān, VI, 142/141; the dried raisins of Ṭāʾif were famous. The apple and the fig are scarcely mentioned by the poets or in *ḥadīṯ*s.

The pastoral nomads were able to use also, in addition to the meat and the milk-products provided by their flocks, wild vegetables, game and small desert animals. Among the plants may be mentioned *kabāṯ*, the ripe fruit of the thorn tree *arāk* (*Capparis sedata*), desert truffles, which, according to a saying attributed to Muḥammad, came from the manna sent to the Israelites, etc. The game mentioned in the traditions are the hare and the bustard (*ḥubārā*); in addition they ate the flesh of the large desert lizards, food which is said to have disgusted Muḥammad, as a member of a settled community; he is said to have regarded these lizards as the metamorphosis of an Israelite tribe.

The inhabitants of coastal regions could also add fish to their diet (Ḳurʾān, V, 97/96).

Besides milk and water (often muddy and seldom plentiful), the Arabs were familiar with a certain number of fermented drinks prepared from dates, honey, wheat, barley, raisins. But wine made from grapes, which (in spite of the fact that there were vineyards at Ṭāʾif for example) was generally imported, was an expensive luxury. It was drunk in the taverns (*ḥānūt*) which were run by the Jews or the Christians of Ḥīra (*ʿIbādī*) and in which women singers (*ḳayna*) performed.

These various resources, which combined foods of agricultural and pastoral origin but which included no, or very few, products from countries outside Arabia, were prepared in a very elementary fashion. The meats were roasted (roots *sh.w.y*, *ḥ.n.dh*, *ṣ.l.y.*) or baked (*ṭ.b.kh*). The meat was cut in slices or in thin strips which were left to dry in the sun (*ḳadīd*). A *ḥadīṯ* is cited according to which the Prophet announced "I am only the son of a woman of the Ḳuraysh who fed on *ḳadīd*". The oven proper seems to have been little known. The only word for oven attested in early Arabic, *tannūr*, is a borrowing from Aramaic and the purely Arabic word *ṭābūn* seems originally to have meant the cavity in which fire was made to shelter it from the wind.

The cooking was simple and made use of very few different combinations of food. Two of the dishes mentioned are *ṯarīd*, associated with the tribal tradition of the Ḳuraysh, consisting of bread crumbled into a broth of meat and vegetables, and *ḥays*, a mixture of dates, butter and milk, both being among the favourite dishes of the Prophet, who said that ʿĀʾisha held among women the place which *ṯarīd* held among food. They made many kinds of broth (*maraḳ*, *maraḳa*), to which tradition

prescribes that plenty of water should be added in order to be able to give some to neighbours, especially a broth of marrows (*dubbāʾ*) and of *ḳadīd*. When on expeditions, soldiers took with them *sawīḳ*, a kind of dried barley meal to which was added water, butter or fat from the tails of sheep. Several dishes belong to the broad category of gruels, the usual food of agricultural peoples (*e.g.*, gruels made with milk and with *samn*); these include *ḥarīra*, made from flour cooked with milk, *talbīna*, a similar dish eaten at funeral meals, *ḵẖazīr* (or *ḵẖazīra*), a gruel generally made from bran and meat cut up into small pieces and cooked in water. We notice that the general tendency is a search for fat, for greasy and heavy food, a tendency which still continues in Bedouin cooking and which is probably dictated by physiological needs. There is little tendency mentioned to spiced foods. The Arabs engaged in the transport of spices, but they were too precious a merchandise for them to use themselves at all frequently. We find mentioned, however, camphor and ginger (Ḳurʾān, LXXVI, 5, 17), cloves, pepper, aloes and the sweet wood called lignum aloes.

There seem to have been few prohibitions concerning food, imposed rather by custom (as with us) than by a definite code of laws, and often restricted to one or to several tribes. It is, at least in part, against pagan taboos of this sort that the Ḳurʾān seems to inveigh (II, 163/168 ff., VI, 118 ff.); there were often prohibitions concerning specific animals (and not a whole species), not as impure, but as consecrated to the Divinity (Ḳurʾān, V, 102, VI, 139/138, where there is also mentioned a harvest—*ḥarṯ*—which is taboo; the flesh of newly-born animals was forbidden to women, with the exception of still-born animals: Ḳurʾān, VI, 140/139). Even at Mecca itself, at the time of the *iḥrām*, the *ḥums, i.e.*, the holy families serving the local sanctuaries, abstained from meat, from clarified butter, from *aḳiṭ* (and perhaps from all milk-products) as well as from oil. There were various portions of meat which were not eaten: the heart among the Ḏjuʿfī tribe, the fat tail of the sheep among the Balī of Ḳuḍāʿa who, not being assimilated with the rest of the Islamic population, still retained this taboo in Andalus, the testicles, at least on feast days; but there may have been here, as in present-day Arabia (in spite of the religious agitation which appears to have been provoked among the Ḏjuʿfī who were forced by Muḥammad to break the taboo) "rational" motives: in north-western Arabia they do not eat the hearts of birds for fear of becoming as timorous as they are; Huḏẖalī poets reproach the South-Arabian tribe of Marṯẖad for eating grasshoppers, but this was rather a special distaste for this food, or an affectation. A later saying claimed that the Bedouin ate "everything that crawls or walks except the chameleon" (*umm ḥubayn)*. According to Sozomenus (5th century A.D.), the Saracens abstained from pork and observed a number of Jewish ceremonies; it was probably a case of the Arab neighbours of Palestine coming under Jewish-Christian influences. But Pliny had already noted the absence of pork in Arabia. In case of vital necessity, which often arose in the severe conditions of desert life, all the taboos were relaxed, even the general taboo on human flesh though it should not therefore be thought that cannibalism was general, but during battles the heat of passionate hatred, or particular rites, often led men to drink or lick up the blood or the brains, to gnaw the liver of the dead, etc. Vows were made of temporary abstinence: from *samn*, milk, meat, wine, sometimes even to fast completely. In some regions wine must have played a religious

part. Some rather doubtful texts speak of libations of wine poured on tombs. In Liḥyān it is perhaps a case of a large offering of wine to Dhū Ghābat to expiate a murder. At Palmyra, wine was ceremonially drunk at the funeral banquets of the *thiasoi*. It is perhaps to this sacred importance that we are to attribute the frequent use in Saphaitic of names such as Shrb (Sharīb? "drinking companion") and Skrn (Sakrān "drunk" "intoxicated") At Mecca, at the moment of deconsecration which concluded the *ḥadjdj*, there was ritually drunk a fermented beverage with a basis of grapes (*sharāb, nabīdh*) or of barley and honey (*sawīḳ*) and this rite was continued under Islam until the 2nd/8th century; a similar rite at the beginning of the ceremonies could explain the name of *yawm al-tarwiya* which is given to the first day. But, in other regions, in other circumstances or in other cults, there was abstinence. Wine was one of the things which people most often vowed to renounce; in particular those swearing vengeance abstained from it until their vengeance was accomplished. The Nabataeans did not drink wine and the Arabs in general had the reputation of being water drinkers. A Nabataean set up at Palmyra in 132 A.D. two altars to his god Shayʿ al-ḳawm who, as he emphasizes, probably with polemic intent, "does not drink (or perhaps: does not allow to drink) wine". This is very probably the god known in Greek as Λυκοῦργος, who was regarded as the opposite of Aʿara Dhu 'l-Sharā, in Greek Δουσάρης and identified with Dionysos, hence the mythical story of the fight between the god of wine and his enemy.

Shortly before the time of the Prophet, those who were attracted to monotheism [see ḥanīf] would seem to have adopted certain prohibitions in order to conform to the Noachic precepts enjoined upon Jewish proselytes and in general adopted by the Christians (*Acts*, xv, 29). An example is Zayd b. ʿAmr from the ʿAdī clan of the Ḳuraysh, who is said to have abstained from animals which had not been ritually slaughtered, from blood and from meat which had been sacrificed to idols. Others, probably from asceticism, under the influence of the earlier practices mentioned above and of the abstinence which was enjoined by Manicheism, by the Christian ascetics and certain Christian sects, and which was practised by other Semitic peoples (if the fact is indeed true), are said to have abstained from drinking wine—*e.g.*, another Ḳurashī, ʿUthmān b. Maẓʿūn, who was later to embrace Islam. Musaylima forbade wine as well as sexual relations to those who were already fathers. It has been possible to compile a list of those who abstained from wine in the Djāhiliyya.

The epigraphic sources add hardly anything to this picture for central and northern Arabia. They do, however, illustrate the importance attached there to game and hunting. This importance is also reflected in the rock engravings which accompany the graffiti or are contemporary with them. They hunted gazelle, ostriches, ibex, perhaps also wild asses etc. A "Thamudean" text mentions the capture of a lizard (*wrl*), perhaps for food. The domestic animals mentioned: camels, cattle, sheep, horses, donkeys, were used partly for food. The reference to an abundance of milk and the reference to bees are dubious, as are the references to dates. Fish caught in the pools of stagnant water on the edges of the desert were preserved by drying.

ii.—Pre-Islamic Southern Arabia

Southern Arabia was much more agricultural and thus afforded a much greater variety of vegetable food. The dates (*tmr*)

supplied by the many palm groves (*nkhl*) which are often the subject of the inscriptions must have been one of the staple foods. The sweet pith from the centre of the trunk of the palm tree (in Arabic *ḳulb, ḳalb, lubb*, etc., often confused with *ǧummār*, palm-cabbage) seems to us to be the *lbb* which was preserved in a temple. Wheat was produced only in moderate quantities and had to be imported. Taxes were paid in flour. Flour (*ṯḥn*, flour in general, *dḳḳ*, the flour of cereals, perhaps *khrṣ*?) was made with wheat (*br*), barley (*sh*ʿ*r*), dates (*tmr*), *ǧdhdht*, which was perhaps a kind of wheat (it seems difficult to translate it literally as its Arabic equivalent *ǧadhīdha* "wheat husked and crushed"), and in addition semolina (*sdl*). Vegetable gardens (*tbḳlt*), orchards (*mhgrt*), and vineyards (ʾ*nb*) were numerous. They produced vegetables (*bḳl*, translated "broad beans") and fruit (*thmr*). The country produced sesame oil, but not enough for its needs and had to import it via Moscha. As a condiment they used capers which they soaked (*kbr wlkh*), and they imported saffron for the same purpose. Cinnamon, also imported in transit, obtained too high prices on the Roman market to be used locally. The *dbs* which was distributed in large quantities to the workers on the dam of Mārib must have been a treacle of grapes or of other fruits, different from the honey which according to Pliny was produced in abundance in the kingdom of Saba. Eratosthenes mentions numerous apiaries (? μελιτουργεῖα) in Southern Arabia.

The meat (*bshr*) was in the main that of animals slaughtered (*tbkh*, cf. Hebrew *ṭib* h *ḥåh*) probably according to the usual Semitic rites. For the workers engaged on the repairs to the dam of Mārib they slaughtered thousands of cattle (*bḳr*) and probably also sheep, one sort of which had the characteristic name of *dhbyḥ* (Ar. *dhabāʾiḥ* "victims") and the other the enigmatic name of *ḳrṣ*, and, on one occasion, 207,000 *ḳṭnt*, which seems to represent portions rather than head of sheep and goats. They were given also 1100 ʾ*ḍḥ* ("lambs used for sacrifice" to judge from Ar. *aḍāḥī*, pl. of *ḍaḥiyya*) and ʿ*ḍwd* (perhaps "fat lambs" to judge from Ar. ʿ*aḍūd*?). The sheep were called elsewhere *khrf*, and in the Minean colony of the Ḥidǧāz *ḍʾn* (in contrast to the goats *mʿẓy*) called in Saba *ṣfr*). According to Eratosthenes they ate also birds, except for geese and hens. On the shores of the Indian Ocean, some communities ate mainly fish and the nomads lived on game. These people drank milk and the workers of Mārib were supplied with butter (*khmʾt*, Hebrew *ḥèmʾåh*, Akkadian *khimētu*, etc.).

The main drink seems to have been palm wine, which was called *mzr* m *dh-tmr* m (cf. Ar. *mazar, mizr*, the word for various fermented drinks) or *sḳy* m *dh-tmr* m, perhaps with a north Arabic gloss *al-ḥalab*. However, the numerous vineyards (cf. above, and the popularity of the Dionysiac themes making use of the vine in sculpture) provided grape wine and a certain amount was imported. The workers on the Mārib dam were provided with more of this than of palm wine. A distinction was made between the fermented beverage (*sḳy*) made with the excellent grapes of Ghirbīb (*ghrbb*, cf. the classical dictionaries) and that prepared from dried raisins (*fṣy*, cf. *fuṣa* n). The *shnn* kept in a temple is probably the *shanīn* "whey or milk diluted with water" known in various Arab countries. We do not know whether the thermal springs of therapeutic value, which according to Ammianus were numerous, were used for drinking.

Almost nothing is known about the ritual use of foods. Libations (*msty*) were made on special altars (*mslm*), but we do not know what was the liquid used. Nor is anything known about the prohibitions

concerning food. Nevertheless Eratosthenes mentions the absence of pigs among the domestic animals of the region.

iii.—Regulations concerning food in early Islam

Muḥammad's reforms were made under the influence of a milieu in which each religious community was distinguished by its own regulations concerning food. We have seen how in the pagan milieu the situation was rather chaotic, and there was the influence of the Noachic code, imposed on proselytes by the Jews and coinciding more or less with the original Christian code. The Revelation in this respect also was to put an end to ignorance and errors and the Prophet was to declare lawful (*ḥalāl*) "good" foods (*al-ṭayyibāt*) and unlawful (*ḥarām*) unclean foods (*al-<u>kh</u>abāʾi<u>th</u>*; Ḳurʾān, VII, 156/157). But the Ḳurʾān insists above all on the beneficial nature of food in general. Food is one of the greatest of Divine blessings (often in the Meccan *sūra*s: LXXX, 24; XVII, 72/70; XVI, 74; XIV, 37/32, etc.), which, however, must be used with moderation (VII, 29, Medinan) and which must not be rejected except in specific circumstances. The word "eat (*kulū*)…" occurs nearly thirty times. Muḥammad is said to have obliged two newly converted <u>Dj</u>uʿfīs to eat heart, taboo in their tribe, without which their conversion would have been incomplete. The Ḳurʾān inveighs against men who arbitrarily deprive those who listen to them of certain foods II, 163 f./168 f.; V, 89 f./87 f.; VI, 118 ff.; VII, 30/32; XVI, 117/116, texts which seem to belong to the beginning of the Prophet's stay at Medina). In some cases it is certain that the adversaries aimed at are pagans observing the prohibitions described above (II, 165; VI, 139–51/138–50; X, 60/59); but at Medina it became important to define Islam as against Judaism.

The mass of Jewish prohibitions concerning food led to the emphasizing of the fact that Allāh does not wish to impose too many burdens on His faithful people (II, 286). It seems that the Ḳurʾān is sometimes criticizing Judaizers or *ḥanīfs* who imposed on themselves excessive restrictions (VI, 118 ff.) and who wanted to influence the Prophet to do the same (VI, 116). The Jewish prohibitions (rather inexactly defined in VI, 147/146) are explained as a Divine punishment of the sins of the Israelites (IV, 158; XVI, 119). This is proved by the fact that they were not imposed on them before the revelation of the Torah, except for a prohibition, not of divine origin, which Isrāʾīl (Jacob) had imposed on himself (III, 87/93), a reference to the prohibition of the sciatic nerve after the struggle of Jacob and the angel (*Gen.*, XXXII, 33). They were moreover partially lifted by Jesus (III, 44/50). "Today" (V, 7) these forbidden foods are therefore permitted. We have here ideas taken from the Christian polemic against the Jews, particularly as exemplified by the Syriac writer of Iran, Aphraates (4th century A.D.). Only a limited number of prohibitions were retained: blood (and consequently "strangled" meats), *mayta*, *i.e.*, the flesh of a dead animal or one not killed specially for meat, pork, animals consecrated to a pagan divinity (II, 168/173; V, 4/3; VI, 146/145; XVI, 116/115). In addition, during the Pilgrimage it was forbidden to those in a state of ritual purity to kill or (*a fortiori*) to eat game (V, 1, 95/94 ff.), while fish was permitted (V, 97/96; cf. XVI, 14). It was necessary only to invoke (*<u>dh</u>akara*) the name of Allāh on lawful foods (VI, 118 ff., 139/138; XXII, 35/34). Involuntary infringements of these rules, through force majeure or compulsion, are moreover regarded by

Allāh with indulgence (II, 168/173; V, 5/3; VI, 119, 146/145; XVI, 116/115). They defined the Muslim community, but only as a particular category within the wide family of the Possessors of the Scripture, since it is permitted to eat the food of the *ahl al-kitāb* and vice-versa (V, 7/5). In fact, these prohibitions go further in conformity to the Jewish regulations than the Noachic regulations, which the Jews theoretically admitted as sufficient for any strangers allowed to live with them (only not to eat unbled meat, according to *Gen.*, IX, 4). There was, in short, a falling into line with the primitive Christian position (which remained very closely observed in the East) as it is defined by the decree of the Apostles (*Acts*, XV, 29). They went further in demanding also abstention from pork. This abstention, one of the first to be practised by Judaizing pagans, was also the rule among certain Judaeo-Christians and it was presumably through this route that it became adopted in Arabia; it was also adopted by the Christians of Ethiopia in imitation of the Old Testament. The insistence on the lawfulness of fish arose perhaps from opposition to a Judaeo-Christian and Samaritan practice. In addition, an entirely new restriction appears in the Divine revelation: at first it praises the virtues of wine (XVI, 69), which is one of the delights promised to the elect in Paradise (XXXVII, 44/45 ff.; XLVII, 16/15), but later has reservations about it (II, 216/219), and then forbids it (V, 92/90). The commentators and the historians disagree on the causes and the date of this prohibition. The association with the prohibition of *maysir* suggests a link between wine and pagan usages and we have seen above that abstention from wine was a religious practice fairly common in Arabia in various milieus and on various occasions. It does not seem easy to agree with W. Montgomery Watt that it was also partly a case of discouraging the import of an expensive commodity which came from enemy countries. The initial indifference about it and the injunction contained in verse IV, 46/43 seem to indicate that this prohibition was essentially a reaction against the deplorable effects of drunkenness within the Medinan community, one of them perhaps being excessive extravagance. This does not exclude the possibility that the practices of abstention mentioned above contributed to the enactment of the prohibition. In addition to these general prohibitions on the eating of specific foods, Islam decreed a general temporary abstention from food at periodic intervals—the fast of Ramaḍān.

iv.—Food in the traditional Muslim world

In the Arab empire, which after 132/750 became the Muslim empire, the food in the various occupied countries naturally continued to be the same as it had been before they were conquered. The Arab conquerors adopted it, after a certain period of adaptation, perhaps adding certain dishes or practices of their own. For the food of each country reference should be made therefore to works describing the diet in the pre-Islamic civilizations. The picture had been somewhat modified by the influence of Greek and Roman customs. However, the Muslim conquest created a relatively coherent cultural area which survived the fragmentation of the political unity which had brought it into being. Yet the differences between countries are important. To give a picture of the food and its variations throughout the whole of this area would be a vast and difficult enterprise for which the necessary detailed monographs do not exist. We shall limit ourselves here to indicating the main factors which influence all these diets. References to precise facts have in most cases only the value of examples taken at random.

1. *Products consumed*

The formation of new cultural frontiers leads to the spread throughout the territory concerned of products which have formerly been known only in one section of it. In the case of products too heavy to transport, this spread can take place only by their being grown or made locally. The most striking phenomenon in the Muslim world was the spread of the growing of rice and of sugar cane.

Rice, originally from India, was already in pre-Islamic times being cultivated in Iran, in ʿIrāḳ and in Syria, but had hardly been used as food in the Roman world (only as a thickening for sauces); it spread as a crop and as food as far as Spain. It became a common item of food and especially of the poor (particularly in the form of bread made from rice flour) in the areas where it was intensively cultivated, but elsewhere it remained relatively a luxury food, used only in recherché dishes. In any case it did not take the place of wheat and did not acquire the importance which it had in India and in the Far East.

Sugar, introduced to Iran from India perhaps shortly before the Muslim conquest, spread after this through the whole of the Mediterranean world. It was used in the food of princes and wealthy people, but among the poor was found chiefly as a medicine. Honey was generally less expensive, and in particular *dibs*, a treacle of grapes, carob etc., was the sugar of poor people.

Large-scale transport was particularly necessary to bring to the towns from the surrounding countryside food products such as wheat which were consumed in large quantities. Wheat was everywhere a commodity traded on a large scale.

Certain heavy products regularly consumed were however transported by caravans or by ships (river or sea transport) considerable distances from the specific region in which they were originally grown. Examples are Syrian olive oil coming down the Euphrates, the dates of Lower ʿIrāḳ or of Arabia, etc., and, later, coffee from Arabia. Thus there were great differences in price for the same commodity in the regions in which it was produced and those which were at varying distances from them, a further factor being the difficulty or otherwise of the transport (the price of rice rose in Istanbul when unfavourable winds delayed the ships from Alexandria).

The products of all the regions of the Muslim world were thus available throughout every part of it to those who could afford the sometimes high prices; but in addition there were available products imported from outside. Thus, in the Middle Ages, the Near East imported from Russia and the Slav countries dried and salted fish, honey and hazel nuts. In times of scarcity, Egypt in the 5th/11th century imported wheat from the Byzantine Empire. Imports from Europe became numerous from the 6th/12th century onwards. Frederick II sold cereals to Tunisia and Andalusia, the Pisans exported Tuscan oil to Tunisia, southern France in the 7th/13th century sent to the Maghrib wine, chestnuts, broad beans, saffron etc. Tuscan saffron was on sale in the Maghrib, in Egypt and in Frankish Syria. Egypt imported cheese from Sicily and from Crete. In the Middle Ages, Iran imported from India peas, wheat, barley and millet. In the 12th/18th century Europe exported to the Levant spices, sugar, coffee etc.

Spices were imported from still more distant places, their lightness for transport and the high prices they commanded justifying the long journeys. From China, the Sunda Isles, India and East Africa came pepper, ginger, cinnamon, cloves, cardamom, mace, betel, musk and nutmeg.

2. *Storage and preservation*

The preservation of food is an important problem in all societies. The Muslim civilization had inherited processes from the ancient East and from the classical civilizations. Cereals were stored either in granaries or in silos (*maṭmūra*) and the agronomists recommended various processes to preserve them from decay, weevils, etc. For fruit, especially grapes, there were handed down various recipes for preserving them from any deterioration and keeping them fresh. Preservation by cold storage was known; melons from Transoxania were transported to Baghdād packed in ice inside lead boxes. Drying was a less expensive and more widely used process. We have seen that before Islam the Arabs were already familiar with the drying of meat (*ḳadīd*) and of fish. Desert truffles were also dried. Fruits were often preserved in a sealed air-tight container which was sometimes buried in the ground. The curing or smoke-drying of meat seems to have been very little known among the Arabs; it is described as being a Greek process. It was, however, one of the processes applied to *sharāʾiḥ*, slices of meat, in particular to those known as *miṣriyya*, "Egyptian", and known in some places as *mudakhkhana* "smoked". The crystallizing of fruits in honey or sugar, a process known to ancient Rome and a speciality of modern Damascus, was known there at this time according to A. von Kremer, *Culturgeschichte des Orients unter den Chalifen*, Vienna 1875–7, ii, 333, who however quotes no evidence. *Ḳadīd*, or dried meat, must have been coated with fat. But the chief method of preservation was by means of antiseptic agents, particularly salt and vinegar, often used together and with the addition of many condiments; hence the names of these preserves: *mukhallalāt*, *mulūḥāt*. In addition to vinegar and salt (steeping in salted water, impregnating with salt), a great deal of honey, or its substitutes sugar and treacle (*dibs*), was used in these preparations, also lemon juice, oil, mustard, walnuts or hazel nuts roasted and crushed, all kinds of herbs and spices, etc. In this way were preserved, for long or short periods according to the preparation used, vegetables, fruits and also (using vinegar, oil, etc.) small fishes and birds (*ʿusfūr*). Special preserves were made (often to be kept for a shorter period) to be used, spread on bread or otherwise, as a kind of hors d'œuvre: many condiments and salted herbs, or herbs mixed into salted goat's *laban*. In their preparation, *laban* and *ḳanbarīs* (curds) were sometimes used. Spices made possible also the preservation of sausages, of which those considered the best contained only mutton without beef, goat-meat etc., and not too much semolina; their name, *laḳāniḳ*, *naḳāniḳ*, betrays their Roman origin (*lucanicae*, sausages of Lucania). The principal method of preserving milk was in the form of cheese. The eastern Jews sometimes transported kosher (*ḥalāl*) cheese very great distances; the transport of food over medium or long distances enabled the inhabitants of the larger cities to enjoy a rich variety. Generally speaking, the preservation of food was sometimes done by the producers for home consumption or for sale (*e.g.*, cheeses), sometimes by the wives or the servants in private households or in palaces, and sometimes it was the work of specialist craftsmen and prepared to be sold at a later date, sometimes after transport. The manuals of *ḥisba* enjoin the *muḥtasib* to make sure for example that any fish left unsold was salted. But there was very little which resembled the modern food-preserving industry, though one might so classify the sausage-sellers (*naḳāniḳiyyūn*, see above), perhaps those who sold slices of meat (*sharāʾiḥiyyūn*), and

the sellers of confectionery (*ḥalwāniyyūn*), traders who themselves preserved food for sale. Among them should also be included the *bawāridiyyūn*, makers and sellers of *bawārid*, cooked green vegetables preserved in vinegar or other acid liquids.

3. *Preparation*

Foods often went through varying degrees of preparation before reaching the consumer, thus reducing the work done domestically. Flour-grinding, work done by the women in country districts, was often in towns done by mills which provided flour ready prepared (*ṭaḥḥān* "miller"). Kneading of dough was generally done at home, but sometimes by bakers (*khabbāzūn*). The Mālikī and Abāḍī schools sometimes stipulated that a wife could not be obliged to grind corn and that her husband, in this case, was to supply her with flour and not grain. But in most cases dough was taken to the owner of a bakehouse (*farrān*) to be cooked. Pastries and sweetmeats were also made by craftsmen, as were the various dishes which were sold ready cooked by the *ṭabbākhūn* "keepers of cook-shops", the *harrāsūn* or *harā'isiyyūn*, sellers of *harīsa* in its popular form (minced meat and wheat cooked with fat), the *bawāridiyyūn* "sellers of *bawārid*" (see above), etc., to be taken away or eaten in the shop. European visitors to Cairo in the Middle Ages speak of 10,000 to 12,000 cooks in the streets, the 'Saracens' seldom doing any cooking at home. Meat was dealt with by specialists who carried out the slaughter (*dhabbāḥ*), the cutting up or the final marketing (*ḳaṣṣāb, djazzār* with variations in terminology). More specialized products were prepared by the maker and seller of sausages (*naḳāniḳī*, see above), or of slices of meat (*sharā'iḥī*, see above), the roaster (*shawwā'*), the seller of cooked livers (*kubūdī*), of cooked sheeps' (or other animals') heads (*rawwās*), etc. The manufacture of oil gave rise to a real industry, using presses which were sometimes very costly. The industries of wine and other fermented drinks were widespread, for the use of Christians and Jews, although varying numbers of Muslims did not fail to take advantage of them; thus in the Mamlūk period Syria was a wine-growing country while Egypt was not. The prohibitions applied to this manufacture were only of fairly limited extent; *e.g.*, under the Ottoman empire in the 11th/17th century it was forbidden to make wine or *rāḳī* (*raḳı*) within Istanbul. The extraction and refining of cane sugar formed an important industry; Ibn Duḳmāḳ mentions 58 factories at Fusṭāṭ; it is known that it was an important state monopoly under the Mamlūks; later it was at Cairo that sugar was refined for the use of the palace of the Ottoman Sultan. Sugar was also refined in Syria, in Sicily, in Iran, etc. The confectioners used sugar and honey in various ways (see, *e.g.*, a good description of the work of the maker of *kunāfa*, a kind of vermicelli with sugar or honey, etc., in G. Martin, *Les bazars du Caire et les petits métiers arabes*, Cairo-Paris 1910, 60). Fish was dried and salted so that it could be transported long distances; in Egypt the production of botargo (*baṭrakh, baṭrīkh*) from mullet roes, an industry known from Pharaonic antiquity, still continued. In the Fayyūm, rosewater was distilled.

4. *Distribution*

We have given above some details of the distribution of food when it was done by those who had prepared or preserved it. It should be noted that the handbook on trade by Abu 'l-Faḍl Djaʿfar b. ʿAlī al-Dimishḳī (5th–6th/11th–12th centuries?) classifies grocers as half traders and half craftsmen. The peasant producers came to sell their produce either in the

country, in temporarily set up regional markets, or in the towns, in markets which were more or less permanent. In the larger towns there were wholesale markets supplying the large markets which served the whole of a large town district and also the small local markets. Private householders bought their provisions from the two latter types. These retail markets consisted of specialized little shops: fruit and vegetable sellers, butchers, dried fruit merchants, sellers of spices (*ʿaṭṭār*), grocers who sold various kinds of fats (*baḳḳāl* in Morocco, elsewhere usually *zayyāt, sammān*, etc. with many variants). There are found in the works on the corporations extensive lists of these retailers. As we have said, many variations are to be found in the demarcation and naming of specializations in the different regions. In certain countries at certain times the state played an important part at several stages in the distribution of commodities.

5. *Food consumption and its variations*

In the sociological study of food, special attention must be paid to how consumption varies with different groups and categories of individuals. These variations are due either to natural, geographical and economic differences in the food resources available to each group, or to cultural traditions of varying origins. Muslim civilization provides many instances of this phenomenon, which is worthy of more detailed study; here we shall give only some examples.

The geographical variations are obviously due to the variety of the resources available, and thus to natural conditions. But, at the sociological level, based on these conditions and extending beyond them, the establishment of cultural traditions regarding the choice and the preparation of dishes has created regional specialization. Thus, in the Middle Ages, Egyptian cuisine had a high reputation. In Turkey, the cooks of Bolu were and remain very famous. Cooks from places which were renowned for their food were employed in far distant regions. Al-Ṭāhir brought to Baghdād a Khurāsānī cook, and Egyptian women-cooks were employed everywhere (even in the household of an orientalized Frankish knight of Antioch). This specialization gave rise to the numerous adjectives of geographical origin which accompany or represent the names of many dishes: *e.g.*, there are cakes called *akhmīmiyya, asyūṭiyya*, a sweet called *ḥalwā makkiyya*, etc. Regional foods or dishes were made far from their place of origin, the recipes being transmitted orally or in writing. Thus as early as the 7th/13th century we find in the East recipes for Maghribī couscous. Food is today one of the channels for patriotic fervour. In literature and films, Egypt's national food (*ṭaʿmiyya*, Egyptian beans—*fūl mudammas miṣrī*, Jew's mallow or *mulūkhiyya*) is contrasted with the cosmopolitan dishes affected by snobs. A school textbook relates how an Egyptian student is delighted to find in Oxford an atmosphere of his native country in a restaurant kept by an Egyptian and serving *fūl mudammas*. Egyptian emigrants returning home dream of a good hot *ṭaʿmiyya* rissole.

When massive emigrations take place, the emigrants introduce their traditional dishes into their new habitat. Thus, the great emigrations of Muslims from Spain at the time of the Reconquista brought many Andalusian recipes to the Maghrib, for example the famous *bəṣṭêla* (from Span. *pastel*) of Morocco.

Variations according to the different religious groups are of more importance ideologically. We shall deal later with the development of the principles laid down in the Ḳurʾān, and it is necessary to mention here only that each group tended to

mark itself off distinctly from the others by having its own series of rules concerning food. To eat just like others implied, generally speaking, that a group did not consider itself completely split off from them. In principle one should not eat with the *kāfir*, which gave rise to the vast question of who exactly is to be regarded as *kāfir*. The Ḳurʾān allowed Muslims to eat the food of the *Ahl al-kitāb* and vice versa (V, 7/5, see above). But there is attributed to the Prophet a letter to the Mazdeans of Hadjar according to which Muslims were not to eat meat which they had killed as a sacrifice. Even in relation to the *Ahl al-kitāb*, the law was more restrictive than the Ḳurʾān, at least concerning animals killed while hunting or by ritual slaughter. It was not forbidden but reprehensible (*makrūh*), according to certain Mālikīs, to eat what a *Ḳitābī* had slaughtered for himself; according to others, on the contrary, this applied to meat slaughtered by a *Ḳitābī* for a Muslim. In all cases it was reprehensible to obtain meat from a non-Muslim butcher (Mālikīs). It was advisable to make sure that the name of Allāh had been invoked and not the Cross, or Jesus, etc., though it was permissible to eat, according to all the schools except the Ḥanbalīs, if no name at all had been invoked. However, a *fatwā* of Muḥammad ʿAbduh supporting the same position, issued in about 1903, seems to have provoked heated arguments. But it was reprehensible to eat anything destined for the synagogues, the churches or the feasts of the *Ahl al-kitāb*. In any case meat obtained from an idolater, a Mazdean, a pagan or an apostate was prohibited. To this list was sometimes added Christian Arabs (prohibited by Shāfiʿīs, and reprehensible according to certain Mālikīs). The application of these principles has remained fairly strict until the present day. In China, many of the Muslim carriers take their own bread with them on journeys in order to avoid eating food prepared by infidels. Usāma chose his food carefully in the house of the orientalized Frankish knight mentioned above. However, it is well known that Jewish food conforms to the Muslim rites and thus may be eaten, unlike that of Christians, hence a well-known proverb giving the advice to sleep in Christian beds (which are clean). but to eat Jewish food. However the eastern Christians often tended to conform with the Muslim regulations, At the same time Christians and Jews very often avoided Muslim food. The Christians of Ethiopia reproached Europeans with eating meat killed by Muslims, which they considered as amounting practically to apostasy. The Christians of Nābulus before the 1914–18 war limited themselves to avoiding the meat of animals sacrificed during the Muslim Feast of Sacrifices, while the Copts in Egypt in the 11th/17th century bought no food of any sort from Muslims during this feast. But the Jews of Bukhārā in the 12th/18th century had no scruples about eating animals killed by Muslims. The Afrīdīs of Afghānistān, who claim to be of Jewish origin, eat, therefore, meat cooked by Jews, but, being also Sunnīs, refuse meat prepared by Shīʿīs. A similar separatism concerning food is to be found therefore among the various sects, but was rather exceptional. In the 4th/10th century a jurist of Ḳayrawān refused to eat sugar which came from Fāṭimid Sicily. The question of eating meat which has been sacrificed arises more often. A saying attributed to Ṭalḥa b. Muṣarrif (d. 112 or 113/730 or 731) and used by the Ḥanbalīs extends to the Rāfiḍa the prohibition decreed by Muḥammad concerning the Mazdeans: it was forbidden to marry their women or to eat the animals which they had slaughtered as sacrifices. The Ismāʿīlīs forbade eating the meat of sac-

rifices offered by *mushrikūn* or *ahl al-khilāf*, unless one had witnessed that the name of God had been pronounced over it. They were thus assimilated to the *Ahl al-kitāb*. The Mālikīs discouraged the eating of meat which came from a *bid'ī*, while for the Shī'īs that which came from the enemies of the *ahl al-bayt* was unlawful.

The variations according to way of life are probably the most considerable. The Bedouins differ from the settled populations in their food as well as in other details. Bedouin women refused to marry town-dwellers because they hated the food of the towns, especially green vegetables and the same repugnance is found also among the nomadic Ḳazaḳs in Central Asia. Milk products were a typical food of nomads everywhere in the ancient world and they suffered if they were deprived of them when in settled districts. The difference between peasants and town-dwellers was also often emphasized.

There was hardly any difference between the food of men and women, except perhaps that the idle lives of rich women inclined them to greediness, the love of sweet things, etc. The excursions of groups of women of leisure for picnics etc. were accompanied also by purchases of cakes, fruit, and ices. Hence a regulation of the 10th/16th century forbidding women to go into the shops of the *ḳaymaḳčī*s of Eyyūb and laying down that the Christians should avoid them. Similarly when in the baths women ate sweetmeats and special dishes. In Iran, the offerings to Fāṭima are eaten only by men, at least in one of the first phases of the rite. Moreover, in some places, customs based on magic forbid certain foods to women.

Differences in diet according to age depend on theoretical (and even scientific) opinions concerning food. We shall deal with them below. On the other hand a certain number of differences according to social classes can be traced to economic and social factors. Naturally considerations of price alone restricted the food of the poor both in quantity and quality and had the same effect on that of misers, who were voluntarily poor. In some of the literature about misers, particularly in the masterpiece of al-Djāḥiẓ, the *K. al-Bukhalā'*, much is said about their meagre diet. The food of the poor and of misers was apt to include in particular "filling" dishes which were, at least in appearance, rich in nutritional value while consisting of inexpensive ingredients, like Harpagon's haricot of mutton. Several such dishes are mentioned in the time of al-Djāḥiẓ: *tifshīla, harīsa, fudjliyya, kurunbiyya*. At the beginning of the 7th/13th century lentils also were mentioned as a dish of poor people and they were again despised as the food of the *fallāḥ* by al-Shirbīnī. The distinction between the dishes of the poor and those of the rich was clearly understood by the collective consciousness, as expressed in proverbs, popular literature, etc. Examples of this are found in current proverbs about *burghul* (Turkish *bulgur*) "crushed wheat", a dish of the poor and peasants in Syria-Palestine and Turkey in contrast to rice, the dish of the wealthy town-dwellers. The *K. Ḥarb al-ma'shūḳ* has precisely as its main theme the contest between the food of the poor and that of the rich. The food of the rich was distinguished by the variety of the dishes, their complexity, their expensiveness, the length of time needed for their preparation, an ostentatious freedom of choice expressed by eating foods of little nutritional value. There was obviously an effort to improve the quantity and quality of the diet, but still there were applied the rules of "conspicuous consumption" in food intended to set apart the élite from the masses. The members of the élite were expected to be familiar with the most esoteric dishes, and

they either wrote themselves such treatises on cookery as those produced by people of importance in the ʿAbbāsid period or had these books written for them. Those who aspired to refinement in 4th/10th century Baghdād, the *zurafāʾ*, had strict rules in this matter. The rulers had huge kitchens for themselves and their court, well stocked and equipped, staffed by numerous cooks and their assistants, under the direction of officers such as the *djashnagīr*, the *shādd al-sharābkhāna* and the *ustādār al-ṣuḥba* at the court of the Mamlūks, the *kilārdjı̄ bashı*, "master of the larder" and his subordinates like the *peshkir bashı̊*, etc., all supplied with their provisions by the *maṭbakh emīni* and his staff at the Ottoman Palace.

The quest for the exotic, the partial adoption of the cuisine of foreigners, especially when their civilization enjoys a certain prestige, is another means by which the élite may demonstrate its distinction from ordinary folk. Hence, in the Arab world, the vogue for Iranian dishes, which seems to have begun in pre-Islamic times and was very pronounced in the ʿAbbāsid period, and later the fashion for things Turkish. European influence began in the period of the Crusades, and has naturally been very powerful since the 19th century, as all modern cookery-books demonstrate. Deep though its influence has been (see, for example, the influence of Russian diet in Central Asia, and how this trend has been resisted by the Muslim 'clergy', who call potatoes 'food of Satan' and tomatoes 'fruits made of human blood'), in all countries the traditional dishes retain their popularity. Conversely, Muslim diet exercised a pronounced influence on Christian Europe in the Middle Ages.

6. *Factors of secular ideology in food*

We can class as ideological the recommendations or prescriptions which are based either on a rational deduction from various principles and assumptions, or on the Divine will elucidated in greater or less degree by reasoning. Recommendations and prescriptions of this sort play an important part in food habits. We have seen above how certain of them are connected with differences in diet according to social groups and we shall now deal with some others, beginning with the non-religious ones.

Certain general ideas which are prudent deductions from experience are handed on by popular tradition. Thus we have a list of nourishing foods, and of those which cause wind. But generalizations of a "magic" type are often found: they can grow up from a basis of real attributes which have been observed (birds are timorous, testicles are connected with sexual activity, honey is sweet, etc.), or be deduced from systems of symbolic connexions (yellow is beneficial, black is ill-omened). But these wide and rash generalizations are based on the magic principles of contagion by propinquity, the law of similarity and of opposites, etc. Thus we have seen that in north-western Arabia it is believed that whoever eats birds' hearts becomes himself timorous; similarly medical treatises explain that sheep's liver, heart or kidneys strengthen the liver, heart or kidneys of whoever eats them, while to eat sheep's brains causes loss of memory and stupidity because the sheep is senseless and stupid; in present-day Morocco young boys newly-circumcised are made to drink soup made from sheep's testicles to strengthen them, and it is also the recognized diet for people who are exhausted. *Ḥalwāʾ* made with saffron has been recommended because yellow is a source of gaiety. Honey with

its sweetness assuages mental suffering as does *talbīna*, a dish made with honey, hence their consumption at funerals. It is possible that the dictum attributed to the *faḳīh* of Medina, Rabī'a b. Abī 'Abd al-Raḥmān (d. 136/753–4), according to which the eating of *ḵh*abīṣ (jelly made with starch) fortifies the brain, belongs to this class of popular opinions.

But as well as these there was also the corpus of scholarly opinions, transmitted by books and stemming for the most part from the scientific medicine systematized by the Greeks. It consisted of generalizations based sometimes on systematic research on data which were certainly not self-evident (such as the presence in the human body, besides blood, of the pituitary glands, yellow and black bile), from which the Greeks had drawn up a carefully worked out system, avoiding symbolic data and open in principle to revision, consisting as it did of hypotheses which could be verified or invalidated. It was based on the theory of humours, from which had been deduced all kinds of conclusions on the nature of each food and its suitability to one or another human temperament. Thus all the books of medicine contain a long chapter enumerating, usually in alphabetical order, the attributes and faults of each food from the point of view of bodily and spiritual well-being. Special works are also devoted to this branch of medicine, dietetics. Some of them were translated into Latin and had a considerable influence on European dietetics. The educated classes paid a great deal of attention to dietetic precepts, so that this science was of no small practical importance. To choose one example among scores, there was the book on dietetics written by Maimonides for al-Malik al-Afḍal. Moreover, these scholarly theories penetrated deeply among the masses, where they became inextricably mixed, sometimes in a debased form, with current ideas coming from other sources. At the same time the learned works came more and more to take account of popular ideas on diet. Thus the famous doctor-philosopher Abū Bakr al-Rāzī (d. 311/923 or 320/932) wrote that fresh dates caused ophthalmia, an idea which re-appears later in Ibn al-Bayṭār in the 7th/13th century. It is probable that this theory, which was unknown to the Greeks and to Ḥunayn b. Isḥāḳ, came from popular ideas in the East.

Scholarly ideas on dietetics were influenced by popular ideas, particularly when it came to dealing with diets for special cases. For example the diet of women in child-birth is the subject of only a few general recommendations by the Greek physicians and the first Arab theorists who derived their ideas from them. But later the subject was developed under the influence of popular recipes. Thus a 9th/15th century writer recommends, in addition to foods and medicines intended as remedies for stomach pains etc., fresh ripe dates (*ruṭab*) and, if they are not available, ordinary dates also. This is justified by a *ḥadīth* and by the example of the Virgin Mary in Ḳur'ān, XIX, 25.

7. *Post-Ḳurā'nic religious regulations*

The pious specialists on religious questions who, in the 2nd/8th century, began to advise on the way of life which best conformed to the Muslim ideal recommended or discouraged the eating of certain foods, in accordance with current practice. Gradually these recommendations became canonized, as they were attributed to earlier and earlier authorities ending with the Prophet himself, at the same time that attempts were made to deduce from them general rules, to systematize them and also to bring them into harmony with the few prescriptions, later

more precisely defined and systematized, which are contained in the Ḳurʾān. We cannot here follow the development of this process and we shall deal only with its final results.

The prohibitions concerning food are part of the vast system of Muslim ethics. For this reason there are used for them the usual categories, which include all the degrees, from obligation to prohibition, by way of recommendation, indifferent permission and reprobation. Efforts are made to state the attitude to be taken in every possible case, and even in some very unlikely cases. Procedures are established to settle doubtful cases, all else failing, by ordeal: drawing lots to indicate which animal of a flock has been the object of an act of bestiality and is therefore impure; in cases of doubt as to the provenance of birds' eggs, which would decide whether they were lawful, to use those whose ends differ in width.

The categories of the permitted and the forbidden in this field are (apart from some exceptions) identical with those of the clean and the unclean. There follows from this the obligation to apply to these cases the general idea of contagion, of the contaminating power of uncleanliness, which gives rise to a number of delicate problems to determine the limits of this contagion. The milk and the eggs of unclean animals are obviously unclean; but does an animal who has drunk wine or sow's milk, both of them unclean, become by this act unclean itself? A dog, being unclean, makes unclean any liquid which it has begun to lap or game which it has begun to eat; but there may be another juridical reason for the prohibition in the latter case. The question was much discussed as to how far a mouse (or other unclean animal) which had fallen into a food which was clean caused it to be unclean. In general it is admitted that the uncleanliness is transmitted to the whole of any liquid or fluid matter, but only to the parts of any solid matter which are near to the part touched (unless the mouse has remained there for a long time, according to the Mālikī Saḥnūn. The crossing of a clean with an unclean animal makes their progeny unclean (*e.g.*, the mule).

It became necessary also to lay down the course to be followed when there arose a conflict between the system of regulations concerning food and other principles and exigencies of social life, and to make general rules also for borderline cases. Thus, suicide being forbidden, man has a duty to keep himself alive and in good health. From this is deduced the prohibition of injurious substances, notably intoxicants. But in cases of famine and of extreme necessity, the principle of keeping one's self alive conflicts with the prohibition of what is unclean, and it is acknowledged that the latter must be sacrificed, at least to the minimum degree necessary to maintain life. But limits are set, and also a graduated table of degrees of uncleanliness is established. The question arose and still arises particularly in relation to medicines prescribed by doctors. In the same way a compromise is established between the duty to keep alive and the rights of property: in certain conditions and within certain limits it is permissible to seize by force from a reluctant owner the means for sustaining one's life. In some cases the duty of acting humanely towards animals can also have an influence on what food is eaten (*e.g.*, the recommendation not to slaughter a sheep which is suckling).

The *fiḳh* naturally upheld the food prohibitions laid down by the Ḳurʾān, endeavouring only to define their scope. The prohibition of blood, linked with that of the meat of animals which are dead without having been ritually slaughtered, led to many developments. It was necessary

to define very precisely the method and conditions of slaughter, etc. Although "carrion" (*mayta*), an animal simply found dead, remains completely forbidden except in case of absolute necessity, attempts have been made to mitigate a little the more precise prohibition, given in Ḳurʾān, V, 4/3, of the flesh of animals found strangled or gored, victims of a fall or killed by a blunt instrument. If even a breath of life remains in them they may still be ritually slaughtered and thus rendered lawful to eat. This is the "purification" mentioned in the Ḳurʾān. It was necessary to define in the greatest detail the signs by which the presence of this flicker of life could be recognized or presumed to exist. More serious difficulties are caused by hunting. In general it is necessary to perform the ritual slaughter of the animal before its death, if this is possible. But where this is impossible, it is conceded that the fact of having killed an animal while formulating the intention of slaughtering it ritually and pronouncing the *tasmiya* ("in the name of God") at the moment of sending off the missile may take the place of this ritual slaughter. Naturally the pilgrim who has entered the state of ritual purity (*muḥrim*) may not take advantage of these privileges (in view of the Ḳurʾānic prohibition mentioned above). However some traditions authorize him to eat a wild ass which has been hunted down or, in return for compensation, a hyena. On the other hand, efforts were made to specify how far the unlawfulness of the *mayta* extends to its skin, its milk, its eggs or to any foetus which it might contain. An exception from the prohibition of blood is generally made for the liver and the spleen, which are considered as a solid form of blood. Ritual slaughter is not necessary for fish (or any marine animals), nor for locusts. For *khamr*, the same processes of interpretation are applied to the Ḳurʾānic prohibition. We shall limit ourselves here to mentioning that, on the one hand, the idea of *khamr* is defined by the intoxicating power of the liquor concerned (taking advantage of the meaning of *khāmara* "to be mixed together"), and that on the other hand the prohibition makes it, in accordance with the logic of the system, a drink impure in itself, even in a quantity too small to produce drunkenness. The result is a logical contradiction, which is illustrated when Ghazālī contrasts the Muslim law with the supposed prohibition of wine by Jesus, based solely on its ability to intoxicate. Ghazālī gets over the difficulty by asserting that the drinking of small quantities leads to that of large quantities and drunkenness, which is the line taken in the modern interpretation, which emphasizes the moral, hygienic and social justifications for this prohibition.

Food can sometimes be affected by impurities which have nothing to do with the food itself. Thus the impurity of menstruation (Ḳurʾān, II, 222, and much developed later) leads to the conclusion that the meat of menstruating female animals is impure (*e.g.*, the hare), just as the impurity of women in this state can be transmitted to the food which they prepare. The same applies to food prepared by infidels (including the *ahl al-dhimma*, according to certain authors), perhaps even to that eaten in their company or, in practice, that prepared in utensils which they have used.

The Mālikī school endeavoured to limit the prohibitions to foods declared impure by Ḳurʾānic prescription, with only those restrictions set out above: that the food eaten should be neither harmful nor the property of others. But in general the idea of uncleanliness was extended, as we have seen, to other foods. It concerns always animal food, except where it relates to edible earth, which was sometimes dis-

couraged or forbidden, and, among the Shīʿīs, to water from hot springs, which was discouraged. Lists are given of the impure parts of animals, generally faecal matter and urine (the urine of the camel is, however, permitted as a medicament); to these are sometimes added the sexal organs and other parts. Similarly, acts of bestiality make unclean the meat of the animal concerned, also the eating of excrement. This leads to the case of the *djallāla*, "scatophagous animal", mentioned in *ḥadīth* and developed in great detail by the *fiḳh*, which specifies in particular the length of time which the animal must be kept in supervised isolation and fed with clean food in order to regain its cleanliness and be eaten lawfully.

But, above all, a certain number of animals are added to the pig, which is the only one actually prohibited as such by the Ḳurʾān. For some of these, such as humans and dogs, it is obvious that all that is being done is to make explicit prohibitions which are implicit in the sayings reported from the Prophet. In the case of certain others, a thorough study would be necessary to determine which are of pre-Islamic Arab origin and which arise from the customs already existing among peoples who have become Islamicized. In general, however, Islamic jurisprudence has developed extensively the chapter on the juridical classification of the various animals, with perceptible divergences among the schools.

Over and above the categories elaborated by the schools, on the basis of the Ḳurʾān and Tradition, of foods whose consumption is forbidden or reprehensible, the zealous Muslim may wish to carry the imitation of the Prophet so far as to abstain from foods which, according to Tradition, displeased him personally, but which he did not forbid to others (at least according to most of the texts), although he forbade those smelling of them to enter the mosque: garlic, onion and often leeks, which is probably the reason why according to the commentaries leeks are excluded from the *buḳūl* laid out on the "spread table" sent from Heaven to Jesus and the apostles (Ḳurʾān, V, 111 ff.). Perhaps the lizard should also be added to this list.

In the course of the centuries there have come to be added to this list of prohibited goods new edible products; the fact that they were *bidʿa* reinforced their qualities of being harmful, e.g. intoxicating etc., to induce—but in vain—their prohibition. This has been the case with coffee, *ḳāt*, and tobacco.

Each Muslim sect, formulating for itself a complete doctrine on all points of dogma and practice, has had to make its decisions on the problem of prohibitions concerning food. In general the Ḳurʾānic prohibitions have been adhered to, but some have considered them to have only an allegorical significance or that an era was beginning in which there was no further justification for them. The extra-Ḳurʾānic prohibitions have been deliberately criticized in some circles. The consumption of dogs, habitual in the Saharan Maghrib, was regarded with indulgence by some jurists. The Ḳarmaṭīs of Baḥrayn allowed the meat of cats, dogs, donkeys, etc. to be sold, dogs to be fattened for the table and, at one time at least, seem to have permitted wine. But Ismāʿīlī dogma follows the classical pattern of regulations concerning food, forbidding the flesh of carnivorous animals and birds of prey, that of the hyena and the fox, the mule and the donkey, discouraging that of the lizard and the hedgehog, authorizing that of the hare and the horse (on condition that the latter should not be ritually slaughtered unless it is exhausted with fatigue) as well as that of locusts and fish with scales,

both to be caught alive; condemning the eating of marrow, spleen, kidneys or the genital organs of animals, etc.; forbidding all fermented drinks and discouraging the use of wine-vinegar. Ḥākim forbids in addition to this some plants: *mulūkhiyya* ('Jew's-mallow'), *rashād* (cress or rocket), *mutawakkiliyya* (a dish rather than a plant?), and lupins, because of their name or because they were liked by ʿĀʾisha, Abū Bakr, Mutawakkil, etc. As a further example we may mention the prohibition among the Yazīdīs of the chicken and the gazelle, of cauliflower and lettuce, accompanied by a tolerance towards the use of alcohol. Among the Nuṣayrīs are found in general at least those Muslim prohibitions which are very widespread (camel, eel, cat-fish), the prohibition of the hare, which is strictly Shīʿī, and, among the *Shamsiyya*, equally widespread prohibitions such as those of crabs and shell-fish, that of the porcupine, which is also unlawful for the Shīʿīs, as well as the more surprising prohibition of the gazelle and of vegetables (pumpkins, gumbo, tomatoes). The prohibition laid by this same group upon female animals is reminiscent rather of the practice of the Christian monks of the East. But there were of course local variations.

It would be useful to make a study of the strictness with which these theoretical regulations are applied in practice in the different Muslim countries. The laxity or strictness of observance varies greatly according to regions, social categories, families, etc. The attitude even of the same group or the same individual may vary, according to whether it is a case of one regulation or another. Broadly speaking, for example, it seems that the prohibition of pork has always been more strictly observed than that of alcoholic drinks. Nevertheless in China, where the Muslims live in an area where pork is very much liked, they not infrequently eat it, with or without the precaution of calling it "mutton". The non-Ḳurʾānic prohibitions are often less strictly observed, advantage sometimes being taken of the variations between the *madhāhib*. Thus, at Maʿān and often among the Bedouin of Arabia, there are eaten crows and eagles, which are forbidden by the majority of the schools. Rich Ottomans had sent to them by Christians (to celebrate *Bayram*!) mussels, concealed under green cloth.

In the category of religious prohibitions should be included those which the ascetics imposed on themselves, and which are nowhere prescribed by the Law. Among these is abstinence from meat, which is an ancient practice, probably adopted in order to rival the zeal of Christians, Manicheans, etc., and which may have been reinforced by Hindu and Buddhist influence. The dervish-orders too propagated various prohibitions, thus provoking the protests of the reformers.

It would be interesting to study the way in which the *fuḳahāʾ*, the theologians, the mystics and the philosophers have attempted to justify the prohibitions concerning food. We cannot do it here, but would merely mention that there has always existed a tendency to interpret them in a rational way. Thus al-Marghinānī points out that the aim of the prohibition is to preserve the nobility of the human body by preventing its being sullied through absorbing the substance of base animals. This tendency has developed particularly in modern times, when the apologists lay especial stress on the social advantages and the benefits to health of the prohibition of wine. The mystics favour rather a symbolic exegesis. But the predominant tendency has been to see in these regulations a sign of God's arbitrary will. The expressions of this doctrine often coincide with that of certain

contemporary sociologists, who insist on the arbitrary character of the regulations of social life. These regulations are seen as forming a system corresponding to a necessary pattern which is understood only by God: He sets himself against the ignorant anarchy of men, who are not directed by the Revelation but obey only their own psycho-physiological impulses. This is very well expressed in a *ḥadīth* which is said to have been uttered by Ibn ʿAbbās: "The people of the *djāhiliyya* used to eat certain things and abstain from others simply from distaste. But God sent His Prophet and revealed His Book; He allowed that which was lawful and forbade that which was unlawful in His eyes. That which He has permitted is lawful, that which He has forbidden is unlawful and that on which He has kept silent is tolerated (*ʿafw*). Then Ibn Abbās recited the Ḳurʾān, VI, 146/145".

8. *Aesthetic factors*

Certain ideas, attitudes and recommendations concerning food are based neither on the categories of useful or harmful (ideas and recommendations of secular ideology) nor on those of good or evil (religious ideas, recommendations and regulations), but on those of what is agreeable or disagreeable. Several of these ideas and attitudes are in a sense "natural", that is to say linked with a conditioning which is specific (pertaining to the human species in general), ethnic (with variations due in part to geographical conditions) or individual, based on the physiological peculiarities of the species, the group or the individual respectively. But the physiological facts influencing the species or the group leave at the same time a certain margin of choice. Within this margin, each society chooses and inculcates in its members from childhood a system of values in taste (in the widest sense, *i.e.*, including not only the sense of taste but the sense of smell and others), comprising distinctions and preferences. It is moreover still often difficult (given the lack of sufficiently detailed studies) to distinguish within this system between the elements which are "natural" (based on physiology) although transmitted by tradition and those which belong to the arbitrary rules of social conduct. Furthermore, some small groups set up and propagate their own systems of values, generally within the margin left by the social system, but sometimes exceeding this. Finally, individuals are subject to their own physiological and psychological conditioning, also within the system inculcated by the society and the group, but sometimes going beyond it.

We can mention here only some of the features which are connected with this aesthetic approach to food. Among the distinctions made are of course the four specifically gustative flavours: sweet, sour, salt, bitter (Arabic *ḥulw*, *ḥāmiḍ*, *malīḥ*, *murr*) with the various degrees and varieties of insipidity (Ar. *malīkh*, *masīkh*, "completely insipid"; *tafih* "without either real sweetness, acidity or bitterness"); the qualities, perhaps connected with a chemical sensitivity, such as highly-spiced (in Arabic, as in English, called "hot", *ḥārr*, hence a group of seeds called "hot seeds", *abzār ḥārra*; cf. in French the four "semences chaudes": fennel, carraway, cumin, aniseed), piquant (*ḳāriṣ*, not always interchangeable with sour, *ḥāmiḍ*), astringent (*ḳābiḍ*), pungent (*ʿafiṣ*), or those which correspond more closely to the chemical composition of the foods (fat, Ar. *samīn*, *i.e.*, rich in fats, similarly "oily, greasy, λιπαρός", Ar. *dasim*) and those connected with smell To these should be added the sensations due to heat and cold, to a brittle or soft consistency, etc. The various preferences are expressed with reference to these distinctions. The taste for fat is

readily discernible among both the early and the present-day Bedouin. Those Muslims of today who are anxious to bring their cooking partly into line with European taste condemn the excessive use of fat meat in their dishes. The taste for highly-spiced foods and for sweet things appeared at a more advanced stage of Muslim civilization; it was simply a continuation of the tastes of classical antiquity (against which Sophon and Damoxenos waged a vain campaign in the 4th century B.C.), as were some more specific tastes which have now become disagreeable to us, such as that of rue (*sadhāb*), or that of products which have a very strong smell.

The art of cooking consists in preparing and combining the basic elements in such a way as to produce a pleasant flavour. The combinations take into account the distinction between the sensory qualities, mentioned above, which are attributed to the foods, and the compatability (with a hierarchy of degrees of compatibility) and incompatibility of ingredients, whether used together or eaten following each other. Europeans have often remarked on the use in Muslim cooking of combinations in one dish of foods not in accordance with their own taste, for example that of highly-spiced with sweet and bland ingredients, without a sauce of intermediate flavour to lessen the contrast; there have even been drawn from this deductions, not beyond dispute, on collective psychology. In fact these combinations are not confined to Muslim cooking; they are found in European and American cooking, and were used in the past even more than today. Much use is made of sauces for combining ingredients, as was done in the Middle Ages. Present-day Turkish cooking seeks to avoid having in one dish the taste of meat (roasted or grilled) and that of cooked vegetables. Vegetables cooked in oil are often eaten cold in the Middle East. As among the Romans, meat in the mediaeval Muslim world was usually boiled before being baked or roasted, and for some meat this was a necessity, either because of tradition or in order to make it tender.

At the more elegant levels of society there has developed, following the tradition of the Ancient World, a custom of serving at one meal a succession of dishes of varying flavours. It was introduced in Cordova in the 3rd/9th century by the Baghdādī Ziryāb. This arrangement seems to have been less generally adopted in the East than in the West.

It is natural that some preferences and abstentions which have a national or religious origin or are the result of an arbitrary social tradition should sometimes be justified also by aesthetic arguments. The preferring of mutton to beef is perhaps an example of this.

Aesthetic considerations which have nothing to do with taste are also important. Among them is the visual appeal of dishes, to which there are many references in the mediaeval culinary treatises. Great care is always taken over how a dish is served, and saffron, for example, is often used more for its "rich" golden colour than for its flavour. Also with the aim of delighting or surprising the beholder there were evolved an increasing number of the "disguises" (to use a term from ancient cookery) which were so popular also in Europe in the Middle Ages. Hence dishes with such significant names as *muzawwar(a)* "counterfeit", *maṣnūʿ* "artificial", etc., and recipes such as those for "mock brain" or omelette in a bottle, or the dish composed of 5 animals each inside the other which was devised for Abu 'l-ʿUlā, the governor of Ceuta and brother of the Almohad caliph Yūsuf I. Nowadays, on the contrary, names of this sort are given rather to economical dishes which are imitations

of the more luxurious ones (*e.g.*, Turkish *yalanci dolma*). But attention is always paid to the appearance of a dish, so that even one so common as purée of chick-peas (*ḥummuṣ be-ṭḥīne*), a speciality of Damascus, is always decorated with powdered red pepper, whole chick-peas, etc.

The systematic discrimination of the foods with the pleasantest taste, the drawing up of the rules which govern this according to increasingly subtle criteria, and the search for the most delicious combinations of food, formed the preoccupations not only of head cooks but of a whole distinguished society of gourmets and gastronomes. Gastronomy was especially esteemed in the ʿAbbāsid period, hence the gastronomical gatherings organized by several of the caliphs. Gourmets at the highest level of the social hierarchy took pleasure in preparing and in inventing dishes which were often called by their names. The abundance and the popularity of their writings on this subject were already arousing the anger of Ṣāliḥ b. ʿAbd al-Ḳuddūs (d. 167/783); they wrote especially many treatises on cookery which are now unfortunately lost; poems were composed to celebrate certain dishes. The interest in food of the ʿAbbāsid upper classes has left its trace in the names of dishes created by its most eminent members, for example the *ibrāhīmiyya*, which is named after the prince (at one time anti-caliph) Ibrāhīm b. al-Mahdī. Within the Muslim world, gastronomy, although later less widespread and certainly less paraded because of the growth of puritanism, nevertheless always had its adherents and its poets.

(M. Rodinson)

Drinks

i. Problems of identification and of permissibility

The problem of the distinction between "permitted" and "forbidden" in relation to drinks is a subject of great interest to Islamic religious literature, on account of the prohibition, in the Ḳurʾān, of the consumption of wine. By extension, everything alcoholic is forbidden, and doctors of law devote entire chapters, and even independent works, to the subject of drinks (*ashriba*; for example: *Kitāb al-Ashriba* by Aḥmad b. Ḥanbal). The use of certain receptacles is forbidden to Muslims, because of the ease with which they may be employed for the fermentation of liquids. Liquids which tend to ferment are produced on the basis of fruits, various berries, cereals or honey (mead is called *bitʿ, nabīdh al-ʿasal*); from syrup or from preserves of fruit there derives the *dūshāb* which is sometimes non-alcoholic, but which al-Djāḥiẓ and other authors mention in the context of drinks which can ferment and become alcoholic. Certain jurists of the Ḥanafī and Muʿtazilī schools had a tendency to permit the consumption of some of these drinks, under certain conditions, excluding only wine made from grapes. A more limited group of the Muʿtazilīs (to which al-Djāḥiẓ did not belong) even tried to legalise wine made from grapes, and it is for this reason that Ibn Ḳutayba calls them "theologians of debauchery" (*mudjdjān ahl kalām*).

Now these tendencies count for nothing in Islamic jurisprudence at present (even among the Ḥanafīs), and these numerous and rich testimonies from mediaeval texts are cited only to show the difficulty, in a given historical context, of distinguishing between the "permitted" and the "forbidden", the "soft" and the alcoholic, and above all, to underline the rich variety

of fermented drinks, soft or relatively so, musts and beers. The term *nabīdh*, for example, most often denotes a true wine made from dates (very potent according to pre-Islamic poetry), or from various berries, but—with reference to the *nabīdh* consumed by the Prophet—the religious texts stress the non-alcoholic nature of this drink, which was lightly fermented (or, rather, exposed to the sun for only a few hours, according to the definitions of the texts themselves), in order to prevent any other interpretation of this term in the context of the biography of the Prophet.

ii. Beers

In fact, beers were well-known in the civilisation of that time. For example: 1. *Mizr*; al-Aḳfahsī calls *mizr* by the name of *nabīdh al-dhura*, "beer" of maize or of sorghum, while "beer" of wheat is called in Egypt, *apud* al-Aḳfahsī, *ḥatīʿā*; as for barley beer, *māʾ shaʿīr,* see below under the heading *fuḳḳāʿ*. 2. *Djāʿa*; the revived use of this term in this century, in place of the more widespread borrowing *bīra* (= modern beer). *Māʾ shaʿīr* and *aḳsimā*, see below. 4. *Boza*, see towards the end of the article. 5. *Fuḳḳāʿ*, the long and narrow vessels which, among their others functions, were used for the preparation or storage of this "beer", were the *kīzān* (sing. *kūz*). The *kūz*, often fitted with a handle is frequently mentioned and described in Arabic literature. However, Goitein translates *kīzān* as "bowls", a sense which the word possesses in certain dialects.

There existed numerous kinds of *fuḳḳāʿ*: they are mentioned in culinary literature, among sauces and drinks. The sense of "beer" is clearly evident when the text describes the fermentation (*yakhmar, yathūr*) of this drink. In addition to the references given above concerning the *fuḳḳāʿ*, it could be sweetened and flavoured with fruit (the mediaeval equivalent of "shandy" or almost so; it may thus be with justification that Ahsan attempts to conclude from a very partial reference of *adab* that this drink was invariably soft or even non-alcoholic; however, *apud* al-Ghuzūlī, *op. cit.*, who accurately reflects life in mediaeval Egypt, various kinds of *fuḳḳāʿ* were sweetened to a considerable extent. *Māʾ shaʿīr*, literally "barley water", when fermented becomes "barley beer", of which a special variety exists for the nights of the month of Ramaḍān. *Aḳsimā* = liquid, syrup, but, since one of the recipes mentions the presence of yeast among the ingredients of this drink, it must presumably be a variety of sweetened beer and not a simple syrup as it is usually translated (for the Egyptians, according to al-Ghuzūlī, both the term and the recipe of *aḳsimā* often replace those of *fuḳḳāʿ*). Certain physicians are inclined to define *fuḳḳāʿ*, made of barley or rice, as a relatively soft drink, when compared to real intoxicants, but for the jurists, the mediaeval experts in Islamic law, this drink brings up some difficult legal questions.

iii. Milk

The same works of culinary art also provide a wide range of recipes of which the primary ingredient is milk, but it may be assumed, judging by the method of preparation, that in the majority of cases the references are to sauces accompanying food rather than to drinks as such. In fact, without refrigeration, it was not easy to preserve milk, except with the addition of preservative elements, e.g. salt, or allowing it to curdle. In fact, ever since the pre-Islamic period the Arabs were well aware of the importance of milk as a nutritive element, with numerous terms denoting its varieties and properties and verbs and adjectives used to identify the stages of curdling (*rāʾib* = clotting, for example), and it is thus that numerous pages are devoted to milk in the lexical literature. The pre-Islamic Arabs were

great breeders of camels and dromedaries, and it is often to their milk that these terms apply. Muslim civilisation was familiar with the milk of all kinds of beasts and geographical literature refers to it at times. Ibn Ḳutayba knew that it was possible to ferment these milks, e.g. that of the camel, although it was the milk of the mare which was more popularly used for fermentation a few centuries later (koumiss was often produced from fermented mare's milk, as was *kefir*, generally less potent; some varieties still exist today which are even given to children to drink). This came about through the influence of the peoples of Central Asia and those from the native lands of the Mamlūks; the latter also drank koumiss, in spite of the hot climate of Egypt. As has already been mentioned, curdling, or even salting, were effective means of preserving lactic drinks, in a period when refrigeration was still unknown, and in relatively hot regions. It is thus that a land may be renowned beyond its geographical borders for the quality of its lactic products (the Syro-Palestinian region, for example, is praised for its yoghourts, etc.). Moreover, it is thus that certain of these drinks are still known today, for example *laban* (originally *laban* means nothing more than "milk", but in certain dialects the distinction has arisen of *ḥalīb* = milk, *laban* = fully or partially curdled milk), *ayran*, among the Turks, and there is an Iranian equivalent, *dūg̲h*, sometimes a little more salted. Some ancient texts describe yoghourts (*yog̲hurt*) and give the recipes with instructions on how to dilute it with water, producing a drink which would resemble the above-mentioned *ayran*.

iv. Water as a drink

In spite of the preference for milk over other drinks on the part of the Prophet, he is also credited with such remarks as "Water is the mother of all drinks", or "the master of all drinks".

Water was an element of prime importance in the life of the ancient Arabs, especially those who lived in desert regions. The literature of medical traditions speaks of the importance of this element as a drink, and gives detailed accounts of its properties and different varieties. In fact, geographical and topographical conditions made it necessary for each region to be content with a given, and often unalterable, quality of water: water from wells (*ābār*), from canals, rivers, etc., a subject of frequent interest to Arab geographers (in particular the so-called "classical" ones of the 4th/10th century; al-Muḳaddasī, in his *Aḥsan al-taḳāsim*, often adds at the end of each description of a region a sub-chapter which contains, among other things, information concerning the different waters of the region, their qualities, etc.). Similarly, culinary literature also devotes special chapters to water, in its capacity as a drink. Well-organised systems of provision of water were rare, but not unknown in the mediaeval period. The water of certain rivers was often neither pure nor clean. The quality of drinking water often depended on the social condition of the consumer, in particular the money available to him to pay the water-bearer (*saḳḳā*), but there were also receptacles, or even special constructions (*sabīl*, pl. *subul*, testifying to the generosity of the benefactors who built them) designed for the use of the general public. By such means, water was distributed to travellers or to the visitors of markets.

v. Water mixed with snow

The wealthy were not satisfied with ordinary water; they were not only prepared to pay more highly for water of good quality but they sought also to refrigerate it. In addition to porous jugs (which had the

effect of lowering the temperature of water by a few degrees), it was possible, even at the height of summer to buy snow, which was one of the most expensive products. The caliph Mahdī even ordered a supply of snow to be brought to him at the time of his pilgrimage. The vendors of snow (*thallādjūn*), in Baghdād for example, had their own storehouses which were filled with snow often brought from afar. Water mixed with a small quantity of snow (*mā' muthalladj*) was such a "rarity" that it was preferred to lemonade. One of the doctors of law even went so far as to write a short treatise on the question of whether it was permitted occasionally to distribute water mixed with snow to less affluent people and to the poor. It is thus that social stratification and its problems are reflected in the domain of *mashrūbāt*.

vi. Fruit-flavoured water, juices and other fresh drinks

Typical examples of the great variety of drinks based on fruits (or pure juice, or mixtures of juice with spices and other ingredients) emerge clearly from books of culinary recipes, including, for example: lemonades and a drink made from ginger; lemonade, orangeade, drinks flavoured with sumac; a variety of soft drinks, sugared and flavoured with fruits, flowers, vegetables, spices etc., e.g. jujubes, apples, lemons, tamarinds, pomegranates and violets. A luxury drink was often a combination of one of these kinds of mineral waters with, in addition, *fukkaʿ* and a little snow.

Since certain of these drinks were considered to be medicines or tonics, some of them may be encountered in medical literature, often in a chapter entitled *ashriba* "drinks" and there even exist independent medical treatises on this subject, but this topic is beyond the scope of the present article. However, some literary works show a fairly profound knowledge of the secrets of medicine (or of popular medicine), including for example al-Djāḥiẓ in his epistle concerning drinks; in another mediaeval literary work, written in colloquial or quasi-colloquial Arabic, a drink made from jujubes is found in the shop of a popular perfumer-pharmacist There is a certain continuity with a whole range of mediaeval drinks, extending into the contemporary period, where fresh or cold drinks are still sold in the streets, often by itinerant traders, such as, e.g., tamarind drink (*tamr hindī)* and liquorice drink (*sūs)*, which are very popular; and the drink made from dried grapes (*zebeeb* according to Lane, *zabīb* or *zbīb* in colloquial speech), *djallāb* (which was known to the mediaeval world). These recipes are not always based on dried grapes and the drink is most often non-alcoholic, but, even today, some devout Muslims abstain from consuming this drink made from dried grapes when it is prepared by non-Muslims, since it is feared that over-long soaking of the fruit produces alcohol. Also worthy of mention here is the *boza* of the Ottomans (whence *būza* in the Egyptian dialect) but it is necessary to distinguish this term from *boza*, *būza* "ice cream" in some dialects of colloquial Arabic, which must rather be derived from Turkish *buz* "ice". This may contain alcohol but soft varieties of *boza/būza* are known.

(J. Sadan)

Wine

The Arabic word *khamr*, although very common in early Arabic poetry, is probably a loan-word from Aramaic. The Hebrew *yayn* has in Arabic (*wayn*) the meaning of black grapes.

1. Juridical aspects

Arabia and the Syriac desert are, in contradistinction to Palestine and Mesopotamia, not a soil fit for the vine; there are, however, exceptions, among which may be mentioned al-Ṭāʾif, Shibām and other parts of Yaman. Wine, probably of an inferior quality, is also mentioned in Medina. Usually, however, it seems to have been imported from Syria and ʿIrāḳ; in early Arabic poetry the wine-trade is chiefly connected with Jews and Christians, who pitched their tent (*ḥānūt*, also a loan-word from Aramaic) among the Bedouins and provided it with a sign denoting its character. In it entertainment sessions were held, in the company of female singers who often also belonged to the establishment. The wine was kept in jars or skins, provided with a mouth-piece which was closed by means of a string.

In the days of Muḥammad the people of Mecca and Medina used to indulge in drinking wine as often as an occasion offered itself, so that drunkenness often became a cause of scandal and of indulgence in a second vice, gambling, which together with wine, incurred Muḥammad's condemnation. Tradition has not refrained from describing how Ḥamza b. ʿAbd al-Muṭṭalib, Muḥammad's uncle, in a fit of drunkenness mutilated ʿAlī's camels. The commentaries on the Ḳurʾān also relate how Muḥammad's companions held drinking-parties which caused them to commit faults in ritual prayer.

The prohibition of wine was not in Muḥammad's programme at the beginning. In Sūra XVI, 69 we even find it praised as one of the signs of Allāh's grace to mankind: "And of the fruit of palmtrees, and of grapes, ye obtain an inebriating liquor, and also good nourishment". But the consequences of drunkenness manifesting themselves in the way just mentioned are said to have led Muḥammad to change his attitude. The first revelation giving vent to these feelings was Sūra II, 216: "They will ask thee concerning wine and gambling (*maysir*). Answer, in both there is great sin and also some things of use unto men: but their sinfulness is greater than their use". This revelation, however, was not considered as a prohibition. As people did not change their customs and the order of prayer happened to be disturbed in consequence thereof, a new revelation was issued, viz. Sūra IV, 46: "O true believers! come not to prayers when ye are drunk, until ye understand what ye say" etc. But neither was this revelation considered as a general prohibition of wine, until Sūra V, 92 made an end to drinking: "O true believers! Surely wine and *maysir* and stone pillars and divining arrows, are an abomination of the work of Satan; therefore avoid them, that ye may prosper". This sequence of revelations regarding wine is the accepted one among the traditionists and commentators of the Ḳurʾān.

The prohibition of wine may, however, also be looked upon from a wider aspect, as Islam is not the only monotheistic religion which has taken a negative attitude towards wine. It is well known that, according to the Old Testament (Numbers vi, 3–4) the Nazarite who had wholly devoted himself to Yahweh had to abstain from wine and spirits, just as the priests before administering the sacred rites (Lev. x, 9). The Nabataeans, according to Diodorus Siculus, likewise abstained from wine and one of their gods is called in their inscriptions "the good god who drinks no wine". Likewise, abstention from wine belonged to the rule of many Christian monks. All this has its roots in remote Semitic antiquity which ascribed a demoniac character to wine and spirits. The same is true for music, especially singing, which is also prohibited by Islam. It is not improbable that negative feelings of this kind may have worked, together

with the motives mentioned above, to induce Muḥammad to prohibit wine.

The prohibition of the Ḳurʾān has been taken over by the jurists; all *maḏhhab*s, and also the Shīʿa, call wine *ḥarām* and the wine-trade is forbidden. Theology reckons the drinking of wine among the gravest sins (*kabāʾir*).

Ḥadīṯ has many utterances regarding this theme. Wine is the key of all evil (Aḥmad b. Ḥanbal, Ibn Mādja). Who drinks wine in this world without repenting of it, shall not drink it in the other world (Bukhārī, Muslim). Cursed is he who drinks, buys, sells wine or causes others to drink it (Abū Dāwūd, Ibn Mādja, Aḥmad b. Ḥanbal). Who drinks a draught of wine on purpose shall have to drink pus on Doomsday. Prayer of him who drinks wine is not accepted by God (Nasāʾī, Dārimī), and faith is incompatible with drinking it (Bukhārī, Nasāʾī). It is even inadvisable to use it as medicine (Muslim, Aḥmad b. Ḥanbal); and it is prohibited to use wine for manufacturing vinegar (Tirmidhī, Aḥmad b. Ḥanbal). But times will become ever worse and there will be people who declare wine allowed (Bukhārī, Nasāʾī), and so it will be drunk by the generation of the last days (Bukhārī, Aḥmad b. Ḥanbal).

The prohibition of wine, although unanimously accepted, gave rise to dissensions between the juridical schools, dissensions which are reflected in *ḥadīṯ* in a historical disguise. The discussions start from the question: what is wine? It is said that, when the use of wine was peremptorily prohibited, the people of Medina poured out in the streets all that they possessed of the appreciated liquor (Aḥmad b. Ḥanbal). Ibn ʿUmar declares, on the contrary, that at the time of the prohibition, there was no wine in Medina at all (Bukhārī). Anas b. Mālik says that there was scarcely any wine from grapes in Medina, when the prohibition was revealed; people used wine from *busr* and *tamr* (two kinds of dates). In another tradition wine from *faḍīkh* and *zahw* (two other kinds of dates) is mentioned. ʿUmar is represented as delivering a *khuṭba* which was meant to settle the question; according to his son ʿAbd Allāh, he said: Wine has been prohibited by the Ḳurʾān; it comes from five kinds of fruits, from grapes, from dates, from honey, from wheat and from barley; wine is what obscures the intellect (*wa ʾl-khamr mā khāmara al-ʿaḳl*; Bukhārī). The question remained, whether beverages prepared from grapes in a different way were prohibited. There was e.g. a kind of syrup. "When ʿUmar visited Syria, the population complained of its unhealthy and heavy climate and they added: This drink alone will heal us. Then ʿUmar allowed them to drink honey. Then they said: Honey cannot heal us. Thereupon one of the natives of Syria said to him: May we not prepare something of this drink for you? It has no inebriating power. He said: All right. Then they cooked it till two-thirds were evaporated and one-third of it remained. They brought it to ʿUmar, who put his finger into it and licked it. Then he said: This is *ṭilāʾ* like camels' *ṭilāʾ* (viz. the pitch with which they smeared their skins). Then he allowed them to drink it" (Mālik). According to the first chapter of the same *kitāb*, however, ʿUmar punishes a man who had become drunk on *ṭilāʾ*. Juice from grapes, prepared by pressing them only, is considered as wine. Ṭāriḳ b. Suwayd al-Ḥaḍramī said to the Prophet, We have in our country grapes which we press. May we drink the juice? He said: No. This negative answer is given three times and when Ṭāriḳ asks whether the juice may be given the sick to drink, Muḥammad answers: It is no medicine, it is sickness (Aḥmad b. Ḥanbal). And not only those who drink and sell wine are cursed by Muḥammad, but also those who press grapes and have them pressed in order to drink the juice (Ibn Mādja).

Another question of importance arose, in connection with spirits: Had they to be considered as wine or not? All the *madhhab*s, except the Ḥanafīs, have answered the question in the affirmative sense. They have consequently extended the prohibition of wine, in accordance with the intention underlying it. Tradition, which is the best source for the history of the origin of several institutions, shows that the question belongs to the much-debated ones. The standard *ḥadīth*, which is found very frequently in the classical collections, runs as follows: "Some men of ʿAbd al-Ḳays went to the Apostle of God and said to him: O Prophet of God, we are a tribe belonging to Rabīʿa; between us and yourself dwell the infidels of Muḍar, so that we can only reach you in the sacred month. Tell us therefore what we have to tell our tribespeople which will open Paradise for us if we to cling to it. The Apostle of God answered: I order four things and I forbid four things. Serve God without associating anything with him. Perform the *ṣalāt*, pay the *zakāt*, fast the month of Ramaḍān and deliver the fifth part of booty. And I forbid four things: *dubbāʾ, ḥantam, muzaffat* and *naḳīr*. They asked: O Apostle of God, how do you know what the *naḳīr* is? He said: Well, it is a palmtrunk which you hollow out; then you pour small dates into it and upon them water. When the process of fermentation has finished, you drink it with the effect that a man hits his cousin with the sword.—Now among these men there was someone who had received a blow of the sword in this way, but he had concealed it out of shame before the Apostle of God. So he said: But from what vessels should we drink then, O Apostle of God? He answered: From leather skins, the mouthpieces of which are smeared with pitch. They answered: O Prophet of God, our country teems with mice so that no single skin can be kept whole. Then the Prophet of God answered: Even though the mice should eat them, even though the mice should eat them, even though the mice should eat them.

This tradition did not meet with general approval. It is said that the Anṣār or other people complained of their difficulty in finding the skins necessary for preserving drinks without their becoming fermented. Thereupon the Prophet is said to have withdrawn his prohibition, wholly or partly (Bukhārī, Muslim). In some versions of this tradition there occurs the restriction that all the fermented inebriating drinks remain prohibited. Innumerable are the traditions which only contain the rule that all drinks which may cause drunkenness are prohibited in any quantity (*kull muskir ḥarām kathīruhu wa ḳalīluhu*) and this rule has passed into many books of *fiḳh* (Bukhārī, Muslim, Aḥmad b. Ḥanbal). Of special traditions prohibiting fermented drinks, there may be mentioned the following. It is forbidden or disapproved of to sell raisins if they are to be used for preparing nabidh (Nasāʾī). It is prohibited to mix together different kinds of fruits so that the mixture should become intoxicating. This tradition occurs frequently; see e.g. Bukhārī, Muslim, Nasāʾī, Ibn Saʿd, Aḥmad b. Ḥanbal. But each of these kinds may be used separately for preparing a non-fermented drink (Muslim, Nasāʾī).

It can easily be seen that the difficulty in this matter was caused by two circumstances. People were accustomed to prepare from all kinds of dates, from raisins and other fruits, drinks which only became inebriating if they were preserved a long time, and probably also if they were prepared after special methods. Where was the line of demarcation between the allowed and the prohibited kind to be placed? Several collections of traditions went so far as to mention *nabīdh* among

the drinks prepared by Muḥammad's wives and drunk by him (Muslim). Abū Dāwūd and Ibn Mādja have preserved a tradition on this subject which is instructive. Ibn Mādja's version is given here: ʿĀʾisha said "We used to prepare *nabīdh* for the Apostle of God in a skin; we took a handful of dates or a handful of raisins, cast it into the skin and poured water upon it. The *nabīdh* we prepared in this way in the morning was drunk by him in the evening; and when we prepared it in the evening he drank it the next morning". In another tradition of the same *bāb*, Ibn ʿAbbās says that the Prophet used to drink this *nabīdh* even on the third day; but what was left then was poured out.

All this could, however, not persuade the majority of the *faḳīhs* to declare *nabīdh* allowed; three of the *madhhab*s as well as the Shīʿa prohibit the use of *nabīdh*. The Ḥanafī school, on the other hand, allows it, when used with moderation, for medicinal purposes, etc.

It would take us too far to give here a detailed survey of the opinions of the *faḳīhs* of all *madhhab*s; it would be superfluous, to some extent at least, because the more important differences regard chiefly *nabīdh* only.

Allowed according to the *idjmāʿ* is non-fermented, very sweet drink.

Prohibited (*ḥarām*), according to the *idjmāʿ*, are wine and *sakar* of every kind. As to wine, there are six cases: to drink it in any quantity or to make use of it is *ḥarām*; to deny this is *kufr*; to buy, sell, present it, etc. is *ḥarām*; no responsibility (*ḍimān*) rests on him who spoils or destroys wine (*mutlifhā*); whether wine is a possession (*māl*) is an unsettled point; it is *nadjis* just as blood and urine; he who drinks any quantity of it is liable to punishment.

Several kinds of products prepared by means of grapes (*bādhiḳ*, *munaṣṣaf*, etc.) are prohibited according to the majority (*ʿāmma*) of the *faḳīh*s.

Allowed, according to the majority of the *faḳīhs* are *ṭilāʾ* (see above) or *muthallath* and *nabīdh* from dates with the restrictions mentioned above. So is juice from grapes when the process of cooking has made to evaporate two-thirds. Muḥammad (Shaybānī) has a deviating opinion on this point.

As to the punishment of him who drinks wine, *ḥadīth* tells us that Muḥammad and Abū Bakr were wont to inflict forty blows by means of palm branches or sandals. Under ʿUmar's caliphate, however, Khālid b. al-Walīd reported to him that people were indulging in prohibited drinks. Thereupon ʿUmar consulted the Companions, who advised him to fix the number of blows at eighty, a number suggested by the Ḳurʾān which prescribes that those who accuse *muḥsanāt* of *zināʾ*, without being able to prove their accusations by the aid of four witnesses, shall be punished with eighty blows (Sūra XXIV, 4).

Repeated drinking of wine, according to some traditions, was punished by death at Muḥammad's order (Abū Dāwūd, Ibn Mādja, Aḥmad b. Ḥanbal). It is, however, added in some traditions that capital punishment in such cases is not according to the *sunna* of the Prophet (Aḥmad b. Ḥanbal, Ṭayālisī).

The different *madhhab*s have adopted ʿUmar's view; drinking wine is punished with eighty blows; if the transgressor is a slave this number is however reduced to forty, because in the Ḳurʾān the punishment of the handmaid's *zināʾ* is fixed at half the amount of blows with which the free woman is punished (Sūra IV, 30). The Shāfiʿis, however, cling to the practice ascribed to Muḥammad and Abū Bakr; with them the number of blows is consequently forty or twenty.

The prohibition of wine and spirits (according to three of the four *madhhab*s) is one of the distinctive marks of the Muslim world; its consequences can hardly be

overrated. This is not seriously affected by the fact that transgressors have been numerous, according to literary evidence. The praise of wine, not uncommon in pre-Islamic poetry, remained one of the favourite topics also of Muslim poets, and at the court of the Caliphs wine was drunk at revelling parties as if no prohibition existed at all. Even the common people could not always and everywhere refrain from their national drink, date wine of several kinds; the caliph ʿUmar b. ʿAbd al-ʿAzīz deemed it necessary to promulgate a special edict in order to abolish this custom.

Wine has a special place in the literary works of the mystics, where it is one of the symbols of ecstasy. In this point they only took over the language of their Christian and non-Christian predecessors. As early as Philo of Alexandria ecstasy is compared with intoxication. Among the Ibāḍiyya, language may have been a reflex of practice; but this cannot be said of Ṣūfīs in general, who on the contrary, clung to the ascetic methods of the *via purgativa*. As to Ḥāfiẓ's wine- and love songs, it is an unsettled point whether they are merely metaphorical or not.

(A.J. Wensinck)

2. As a product

Wine has been known in the Orient since the earliest times, and Arabic literature preserves vague memories of its legendary origin, not omitting to recall the demonic aspect, in accordance with Ḳurʾān V, 90–2. It takes account, on the one hand, of Babylonian traditions linked to Biblical characters such as Adam and Noah and, on the other hand, of the Aramaic-Syriac extra-Biblical tradition, thus symbolising that ancient culture of the Fertile Crescent inherited by the mediaeval Muslim world. Certain versions link the origin of wine to the two great civilisations which were neighbours to Islam, that of Rūm and that of India.

The *Book of Agriculture* attributed to Ibn Waḥshiyya points out the importance of the vine in the Fertile Crescent, and alludes to wines in speaking of the various types of grape which are suitable for their manufacture.

The Arabs who settled in agricultural regions had no real tradition of viticulture; in fact, in pre-Islamic Arabia vineyards were rare and wine-vaults even more so (however, there were some in al-Ṭāʾif). The quality of the wine was mediocre, and a certain amount must even then have been imported, mainly by Jewish and Christian merchants (after the birth of Islam, this commerce was practised exclusively by these two communities, as a result of the Ḳurʾānic prohibition). One should not suppose that the Bedouin knew nothing of wine, nor that they drank it to excess. The truth is that the ancient Arabs were acquainted with wine, though tasting it only on rare occasions such as inter-tribal fairs.

The expansion of Islam enabled the Muslims to familiarise themselves with new regional types of wine, and the taste of the consumers gained in refinement to the extent that connoisseurs were able to appreciate and distinguish between wines of diverse origin; al-Djāḥiẓ speaks even of various "wine-producing regions" (*buldān*). The poets of the Islamic era speak of countries renowned before the advent of Islam for the quality of their wines.

As regards the wine-making process, the information that we have is not very extensive. The grapes were trodden, with a light jumping movement, in a *maʿṣara* (shallow vat), according to an ancient procedure. Wine-presses of circular motion were not introduced in the Orient until very late (some ancient

specimens still exist in certain monasteries in the Lebanon). A poet of the 4th/10th century, describes the *maʿṣara* as a sea of red flames in which the labourer stands, the lower half of his body soaked with the grape-juice. From the 7th/13th century onwards, miniatures provide the best illustrations of the process; here labourers are seen carrying the grapes, others press them by treading them in a vat, hanging on straps in order to jump more easily; in the vat there is an aperture, allowing the juice to flow out into a receptacle; against a wall stand the amphorae (*dann*, pl. *dinān*) with tapered bases, in which the fermentation takes place (in vaults, seldom in the open), and the maturation. These various stages are described in works of literature, while religious treatises aimed at prohibiting the consumption of certain drinks, concern themselves at some length with the various types of vessel used for fermentation.

The mediaeval anthologies and the treatises of *fiḳh* list various ingredients for the manufacture of alcoholic beverages; fruits: dates, figs, apricots, cherries, mulberries, and various berries; cereals: wheat, barley, maize, millet; honey (hydromel is called *bitʿ*); sugar cane; milk (Ibn Ḳutayba speaks of the making of alcoholic drinks from different kinds of milk), especially mares' milk (for making *kūmis*, introduced at an early stage by the Turks, and attested from the 5th/11th century onwards, which was to become the favourite drink of the Mamlūks.

(J. SADAN)

Intoxicating drink

Nabīdh (Ar.) is a comprehensive designation for intoxicating drinks, several kinds of which were produced in early Arabia, such as *mizr* (from barley), *bitʿ* (from honey) or from spelt, *faḍīkh* (from different kinds of dates). These ingredients were steeped in water until they were fermented, and the result of this procedure was a slightly intoxicating drink. There were also combinations of raisins, dates and honey to be found. *Nabīdh* was sometimes consumed mixed with strong intoxicating ingredients like St. John's wort or different kinds of cannabis, so that it had strong intoxicating and hallucinogenic effects. Later on, in some countries of the Islamic world, there has been a change of meaning. In today's Syria, for example, *nbīd* is used for any kind of intoxicating drinks, while in Egypt *khamr* and *nibīd* are used with the same meaning.

Side-by-side with milk and honey, *nabīdh* was also a beverage that was offered to the pilgrims in Mecca. The institution of *al-siḳāya* (also the name of the building, close to Zamzam, where the distribution took place), was an office held by the ʿAbbāsī family. The descriptions by Ibn Saʿd (d. 230/845) and al-Azrakī (d. 244/858) give the impression of referring to the present state of things; in the time of al-Muḳaddasī (d. *ca.* 1000 A.D.) the institution had already passed into desuetude.

There was a lively discussion among the *fuḳahāʾ* as to whether the consuming of this kind of beverage is allowed or forbidden. One argument in favour of *nabīdh* was put forward, for example, by the Muʿtazilī al-Ḏjubbāʾī, who argues that God has created things which resemble those things which were allowed in Paradise but are forbidden on earth. Among them is *nabīdh*, which is allowed for the believers so that they can guess what *khamr* will be like in the hereafter.

Nabīdh, like *khamr*, was used to discredit certain individuals or groups. Thus the calligrapher Ibn al-Waḥīd (647–711/1249–50 to 1312) was suspected of putting wine or *nabīdh* in the ink which he

used for copying the Ḳurʾān, or else there was a rumour about the Ḳarmaṭians, that among them *nabīdh* was forbidden and wine allowed in order to underscore the antinomian character of this movement.

(P. Heine)

Coffee

Ḳahwa, an Arabic word of uncertain etymology, is the basis of the usual words for coffee in various languages. Originally a name for wine, found already in the old poetry, this word was transferred towards the end of the 8th/14th century in the Yemen to the beverage made from the berry of the coffee tree. The assumption of such a transference of meaning is not, it is true, accepted by some who consider *ḳahwa*—at least in the sense of coffee—as a word of African origin and seek to connect it with the alleged home of the coffee tree, Kaffa, although they also assume contamination with *ḳahwa* "wine". On the other hand, it should be noted that the holders of this view do not prove that coffee was exported from Kaffa as early as 1400, and do not quote a similar word in the languages of Ethiopia and adjoining lands, while the usual word for coffee there (*būn* for tree, berry and beverage) has passed in the form *bunn* (in rhyme also *būn*) as a name of the tree and berry into Arabic. But as it is probable that the drinking of coffee spread in the Yemen out of Ṣūfī circles and a special significance was given to wine in the poetical language of the mystics, a transference of the poetic name for wine to the new beverage would not be at all impossible.

The coffee tree was not indigenous to South Arabia and was probably introduced from the highlands of Ethiopia, where it is found in profusion growing wild, notably in Kaffa. But there is no trace of authority for the assertion that the coffee tree was already introduced into Yemen in the period of the Ethiopian conquest and of the fall of the Ḥimyar kingdom, about a century before the Hidjra. In this case the older literature would hardly have left it unnoticed.

The earliest mention of coffee so far found is in writings of the 10th/16th century. According to (Aḥmad) Ibn ʿAbd al-Ghaffār, quoted by ʿAbd al-Ḳādir al-Djazīrī, the popularity of *ḳahwa* as a beverage in the Yemen was first known in Cairo in the beginning of the 10th/16th century. It was there taken especially in Ṣūfī circles, as it produced the necessary wakefulness for the nightly devotional exercises. According to this authority, it had been brought to Aden by the jurist Muḥammad b. Saʿīd al-Dhabḥānī (died 875/1470–1), who had become acquainted with it during an involuntary stay on the African coast and on his return devoted himself to mysticism; it soon became popular.

Another reference in al-Djazīrī, however, ascribes the introduction of the beverage to ʿAlī b. ʿUmar al-Shādhilī. Abu ʾl-Ḥasan ʿAlī b. ʿUmar of the family of Daʿsayn died in 821/1418 according to al-Shardjī. He also might have become acquainted with coffee in Ethiopia, for after entering the Shādhiliyya order, he lived for a period in the entourage of the king Saʿd al-Dīn (*i.e.*, between 788/1386 and 805/1401–2 or 807/1404–5), who gave him his sister to wife. Even after he had founded his *zāwiya* in al-Makhā (to follow al-Shardjī) gifts continued to reach him from admirers in Ethiopia.

In the treatise by ʿAbd al-Ḳādir (Ibn) al-ʿAydarūs (see below, *Bibliography*), ʿAlī b. ʿUmar, the saint of al-Makhā, alone is mentioned as the introducer of the beverage *ḳahwa* (*muḥdith al-ḳahwa*, in a verse

by Shaykh b. ʿAbd Allāh al-ʿAydarūs, died 990/1582). His claim to fame is, it is true, qualified by the note "that, before he prepared the beverage, only the kernel of the husk, *i.e.*, the *bunn*, was used and the husks were thrown on the dung-heaps. In a verse attributed to him, however, he praises the *ḳahwat al-bunn* as a dispeller of sleep and aid to devotional exercises. While al-Shardjī says not a word of his connection with coffee, ʿAbd al-Ḳādir al-ʿAydarūs numbers the introduction of the beverage among his miracles.

The legend as given by Ḥādjdjī Khalīfa seems to have made two individuals out of ʿAlī b. ʿUmar, of whom Alī represents the founder of the Shādhiliyya order, Abu 'l-Ḥasan ʿAlī b. ʿAbd Allāh (d. 656/1258) and his disciple ʿUmar the saint of al-Makhā (Mukhā). The latter was ordered to settle, by command of his teacher who had appeared to him at his own funeral, at the place where a wooden ball which he gave him should come to rest. This is how he came to Mukhā. On the charge of having misconducted himself with the daughter of the king who was staying with him for a cure, he was banished into the mountains of Uṣāb (Wuṣāb, N.E. of Zabīd). He and his disciples, who followed him into exile, are said to have sustained themselves with *ḳahwa* (here the berry) and finally to have made a decoction from it. His visitors were cured of an itch, epidemic in Mukhā, by taking coffee and this procured the saint an honourable return.

The third person who is given credit for the introduction of coffee is Abū Bakr b. ʿAbd Allāh al-ʿAydarūs. An essay by ʿAlawī al-Saḳḳāf contains a statement from the *Taʾrīkh* of Nadjm al-Ghazzī (*i.e.*, apparently *al-Kawākib al-sāʾira bi-manāḳib ʿulamāʾ al-miʾa al-ʿāshira* by Nadjm Dīn al-Ghazzī), according to which the Ṣūfī, who is called here a Shādhilī, once came upon a coffee tree in his wanderings and ate the berries. As he noticed their stimulating effect he took them as a food and recommended them to his disciples, so that they became known in different countries. The reference here is probably to the Ṣūfī of this name who died in Aden in 914/1508–9, whose grave is still honoured there. ʿAbd al-Ḳādir (Ibn) al-ʿAydarūs only mentions his fondness for coffee and quotes his *ḳaṣīda* in praise of it. On the other hand, Abu 'l-Ḥasan Muḥammad al-Bakrī in his treatise *Iṣṭifāʾ al-ṣafwa li-tasfiyat al-Ḳahwa*, fol. 2b mentions Abū Bakr al-ʿAydarūs as the introducer (*munshiʾ*) of *ḳahwa*.

The fact that the merit of introducing coffee as a beverage is given to different individuals, suggests that we have to deal with various local traditions. The tradition of Mukhā is the most firmly established and most widely known; therefore ʿAlī b. ʿUmar al-Shādhilī—who is frequently confused with the founder of the Shādhiliyya order—has become the patron saint of coffee-growers, coffee-house keepers and coffee-drinkers. In Algeria coffee is also known as *shādhiliyye*, after him. He is popularly regarded as the founder of Mukhā, which is, however, already mentioned by al-Hamdānī, although it owed its rise to coffee. A well, a gate and the mosque over his grave preserve the memory of al-Shādhilī in Mukhā.

Al-Shādhilī and al-ʿAydarūs (probably not Ḥaydar) have become Christian monks named Sciadli and Aidrus in the legend given by Naironi. The motif of the camels or goats on which the enlivening effects of coffee were first noticed has so far not been found in Oriental sources. According to a popular legend, the coffee tree shot up from goat's dung sown by the saint.

The legends are probably correct in saying that the taking of coffee in Arabia first began among Yemenī Ṣūfīs. They were particularly fond of the beverage because

its effect facilitated the performance of their religious ceremonies. They therefore considered this as its original "destination" (*mawḍūʿ aṣlī*) and found that it incited to good and hastened on the mystical raptures (*fatḥ*). The pious intention with which it was taken made the drinking of coffee a good work (*ṭāʿa*). It received a ceremonial character, being accompanied by the recitation of a so-called *rātib*. This *rātib* consisted in the repetition 116 times of the invocation *yā ḳawī*. This usage is based—apart from the similarity in sound between *ḳahwa* and *ḳawī*—on the fact that the numerical value of *ḳhwh*, *i.e.*, 116, is the same as that of *ḳwy, i.e., ḳawī*, "strong", one of the most beautiful names of Allāh. According to Shaykh b. ʿAbd Allāh al-ʿAydarūs, the recitation of the *fātiḥa* should precede it. Shaykh b. Ismāʿīl Bā ʿAlawī of al-Shiḥr, however, prescribed the fourfold repetition of the Sūra *Yā-Sīn* (Sūra XXXVI) with a hundredfold *taṣliya* on the Prophet as *rātib*. Thus when taken with a righteous intention and devotion and genuine religious conviction, coffee-drinking leads to the enjoyment of the *ḳahwa maʿnawiyya*, the "ideal *ḳahwa*", also called *ḳahwat al-Ṣūfiyya*, which is explained as "the enjoyment which the people of God (*Ahl Allāh*) feel in beholding the hidden mysteries and attaining the wonderful disclosures (*mukāshafāt*) and the great revelations (*futūḥāt*)". ʿAlī b. ʿUmar al-Shādhilī is reported to have said that coffee, like the water of Zamzam, serves the purpose for which it is drunk, and the saying has been handed down of Aḥmad b. ʿAlawī Bā Djaḥdab (d. 973/1565–66), who in his last years is said to have lived on nothing but coffee:—"He who dies with some *ḳahwa* in his body enters not into hell-fire".

Coffee was probably not known as a beverage in South Arabia much earlier than the turn of the 8th/14th century. Whether the tree was introduced long before this is doubtful. Ibn Ḥadjar al-Haytamī speaks of a beverage which appeared (viz. in Mecca) shortly before the 10th/16th century and was prepared from the husk of the *bunn*, a tree introduced from the region of Zaylaʿ, and called *ḳahwa*. Among the jurists who gave an opinion in favour of coffee, the oldest is Djamāl al-Dīn Muḥammad b. Saʿīd b. ʿAlī b. Muḥammad Kabbin al-ʿAdanī (died in Aden 842/1438).

An *urdjūza* of Sharaf Dīn al-ʿAmrīṭī gives the year 817/1414–5 as the date at which coffee became domesticated in Mecca. According to the *ʿUmdat al-ṣafwa*, however, the drinking of a decoction of coffee husks first appeared towards the end of the 9th/15th century, while previously only the eating of the fruit as a delicacy (*naḳl*) was known. The drinking of coffee dropped out of use again for a time, but it finally established itself and soon people drank coffee even in the sacred mosque and regarded it as a welcome tonic at *dhikr* and *mawlid*. Coffee-houses (*buyūt al-ḳahwa*) were soon opened, where men and women met to listen to music or where they played chess or a similar game for a stake. This and the custom of handing round the coffee in the manner of wine naturally aroused the indignation of the ultra-pious, many of whom had from the first set their faces against the beverage as an objectionable innovation. They found a champion in Khāʾir Bey, who was appointed chief of the police in Mecca in 917/1511 by Ḳānṣūḥ al-Ghawrī. He carried through the proclamation of coffee as forbidden (*ḥarām*) in the same year, in an assembly of jurists of the different schools in which the unfavourable judgment of two well-known physicians and the evidence of a number of coffeedrinkers regarding its intoxicating and dangerous effects ultimately decided the issue. The

ḳāḍīs signed the protocol of the assembly. Only the then *muftī* of Mecca dared to decline his co-operation and became therefore the object of damaging suspicions. By putting the questions in a clever way they were at the same time able to get an opinion condemning coffee from the *faḳīhs* of Cairo. The rescript which Ḳānṣūḥ issued in reply to the protocol sent to Cairo did not completely fulfil the hopes of the opponents of coffee as it contained no absolute interdiction but only allowed measures to be taken against any concomitant features contrary to religion. Ibn Ḥaḏjar al-Haytamī, as late as about 950/1543, had a vigorous discussion, at a wedding feast (*walīmat ʿurs*) where coffee was offered to the guests, on the new beverage with a prominent *muftī*, who declared it intoxicating and forbidden. Ibn Ḥaḏjar refers to the assembly abovementioned and cannot find words strong enough to condemn its decision and the manner in which it was reached.

In accordance with this verdict, Khāʾir Bey forbade the taking and sale of coffee and had a number of vendors punished and their stocks burned, so that coffee husks (*ḳiṯr*) disappeared from the market. But Ḳānṣūḥ's rescript again gave the coffeedrinkers courage and when in the next year one of the leading opponents of coffee was subjected to disciplinary punishment by a high official from Egypt and Khāʾir Bey was replaced by a successor who was not averse to coffee, they were again able to enjoy with impunity the beverage, to which these measures had only attracted the attention of wider circles. Only occasionally do we read of action being taken thereafter against disgraceful proceedings in coffee-houses. An edict forbidding coffee issued by the Ottoman sultan during the Ḥaḏjdj in 950/1544 was hardly respected at all.

In Cairo coffee was first made known in the first decade of the 10th/16th century in the Azhar quarter by Ṣūfīs from Yemen, who held their *ḏhikrs* in the mosque with their associates from Mecca and Madīna while partaking of coffee. After it had been publicly sold and drunk there for a time, the *faḳīh* Aḥmad b. ʿAbd al-Ḥaḳḳ al-Sunbāṭī, famous as a preacher, declared it forbidden in 939/1532–3. Two years later in a meeting for exhortation in the Azhar mosque he so incited his hearers against the beverage that they fell upon the coffee-houses, made short work of their contents and maltreated the occupiers. The difference of opinion thus emphasized caused the *ḳāḍī* Muḥammad b. Ilyās al-Ḥanafī to take the opinions of prominent scholars; as a result of personal observation of the effects of coffee he confirmed the opinion of those who considered the beverage a permitted one. Although in the following years coffee was from time to time for brief periods forbidden in Cairo, the number of its devotees, even among the religious authorities, steadily increased.

Several notable theologians had given *fatwās* in favour of coffee, for example, Zakariyā al-Anṣārī (died 926/1520), Aḥmad b. ʿUmar al-Sayfī (d. 930/1523–4), Abu 'l-Ḥasan Muḥammad al-Bakrī al-Ṣiddīḳī (died between 950 and 960/1543–1553), who in verses in praise of coffee also gives the advice that the opinion of Ibn ʿAbd Ḥaḳḳ should be set aside and the *fatwā* of Abu 'l-Ḥasan followed. Gradually the view came to prevail that coffee was in general permitted (*mubāḥ*), but that under certain circumstances the other legal categories could be applied to it also.

Intercourse with the holy cities and with Egypt brought coffee to Syria, Persia and Turkey. Rauwolf in 1573 found the bev-

erage widely known in Syria (Aleppo). In Istanbul and Rūmili coffee first appeared in the reign of Sulaymān I (926/1520–974/1566). In 962/1554 a man from Aleppo and another from Damascus opened the first coffee-houses (*ḳahwe<u>kh</u>āne*) in Istanbul. These soon attracted gentlemen of leisure, wits and literary men seeking distraction and amusement, who spent the time over their coffee reading or playing chess or backgammon, while poets submitted their latest poems for the verdict of their acquaintances. This new institution was jokingly called also *mekteb-i ʿirfān* (school of knowledge). The coffee-house met with such approval that it soon attracted civil servants, *ḳāḍīs* and professors also. Poets like Māmiya al-Rūmī and later Belī<u>gh</u>ī sang the praises of coffee, and the opinion expressed in 928/1522 by Sulaymān's court physician, Badr al-Dīn al-Ḳūṣūnī was not unfavourable. The coffee-houses increased rapidly in number. Among the servants of the upper classes were *ḳahwe<u>dj</u>i*, whose special task was the preparation of coffee, and at the court they were subordinate to a *ḳahwe<u>dj</u>ibas<u>h</u>u*. In religious circles, however, it was found that the coffee-house was prejudicial to the mosque, and the *ʿulamāʾ* thought the coffee-house even worse than the wine-room. The preachers were specially eager for the prohibition of coffee and the way was paved for them by the *muftīs* (according to d'Ohsson: Abu 'l-Suʿūd) with an opinion that (roasted) coffee was to be considered as carbonized and therefore forbidden. The fact that current politics were discussed in the coffee-houses, the government's acts criticized and intrigues concocted, was the principal cause for the intervention of the authorities. Edicts issued in the reigns of Murād III (982/1574–1003/1595) and Aḥmad I (1012/1613–1016/1617) were not strictly enforced and still less obeyed. The religious authorities met public opinion by declaring coffee legal, if it had not reached the degree of carbonization.

Murād IV 1032/1623–1049/1640) issued a strict prohibition of coffee (and tobacco). He had all the coffee-houses torn down and many forfeited their lives for the sake of coffee. Under Meḥemmed IV (1058/1648–1099/1687), while the sale of coffee in the streets was allowed, the prohibition of coffee-houses was at first renewed by the Grand Vizier Köprülü for political reasons. This prohibition could not possibly be kept in force permanently, and later we even read of measures taken by the government to lower the high price of coffee. From Sulaymān's time a tax was levied on coffee which was at a rate of 8 aspers per *oḳḳa* for Muslim buyers and 10 for Christian; in 1109/1697 there was added an extra tax of 5 paras the *oḳḳa*, which was called *bidʿat-i ḳahwe*, for both.

The coffee tree flourishes in south-western Arabia and does best on the western side of the Sarāt at a height of 1100 to 2200 m., where it finds in the depths of the valleys and on the slopes a fertile, moist soil and the uniform warm temperature necessary for it. The plantations on the slopes arranged in terraces, however, needed regular watering; in addition, the mist that rises in thick clouds out of Tihāma brings them moisture. To protect the trees from the heat of the sun and from locusts they are surrounded by shady trees like carob trees, tamarinds, etc. The tree, which is raised from seed (or propagated from layers), reaches a height of 2 to 5 m. with a diameter of 5 to 6 cm. and yields berries in the fourth year. It is an evergreen and throughout the year bears both blossom and berries in various stages of ripeness so that there is really no fixed harvest-time. The main harvest, however, varying with kind and locality, usually falls in the months from

March to June. After the berries have been carefully gathered and allowed to dry they are shelled in a mill. The beans and the husks are then dried in the sun a second time.

The coffee tree is found as far north as ʿAsīr where it is said to flourish exceedingly on mount Sh-dh-y (Shadhā?) in the land of the Zuhrān (north of the Wādī Dawḳa). The most southern areas of coffee cultivation are Bilād al-Ḥudjriyya, Wādī Warazān and Wādī Banā. To the east we find coffee grown in the land of the Yāfiʿ and in the Djawf. But it is the Ḥarāz mountains, the valley of al-Farsh belonging to the land of the Banū Maṭar, the Djabal Rayma and the district round ʿUdayn that are particularly celebrated for their excellent coffee.

It has always been the custom in Yemen to drink preferably a decoction of the husks, which like the latter is called *ḳishr*, and is to be obtained in numerous coffee-houses (*miḳhāya*). To *ḳishr* as well as to the coffee made from beans, flavourings such as cardamon, ginger, cloves, etc., are often added.

The fresh ripe fruit is pleasing to the taste and nourishing. The eating of the *bunn*—it is not stated whether fresh or dried—is particularly recommended in a *ḳaṣīda* by Ḥamza b. ʿAbd Allāh al-Nāshirī on account of its various health-giving virtues. No information is available as to whether the custom usual among the Galla and in Kaffa of eating ground coffee mixed with butter is also usual in South Arabia. In Persia the eating of dry ground coffee is not unusual.

Ḳahwa is also the name of the room in which coffee is served and thus comes to mean "reception-room" and "coffee-house". The word is also used in the sense of "tip" and "present".

(C. VAN ARENDONK, K.N. CHAUDHURI)

2. The Kitchen, Cooking, and some Preparations

Kitchen

The Arabic *maṭbakh*, cookhouse, is a noun of place, defined by lexicographers as "the cook's house" (*bayt al-ṭabbākh)* from the verbal root meaning "the cooking of flesh meat". The root *ṭ-b-kh* is common to the Semitic family. Already in Akkadian, OT Hebrew, Syriac, Ethiopic and post-Biblical Hebrew we find the further, related connotation of "slaughtering" in addition to that of "cooking". Undoubtedly, the mediaeval domestic *maṭbakh* combined both these functions. By extension of the root meaning, the *maṭbakh* was the place where every conceivable kind of food, including flesh-meat, was transformed from its raw state for consumption at the table.

1. In the mediaeval caliphate

The kitchen has been described as the "birthplace" and the "foster home" of innumerable terms, operations and apparatuses in the early stage of man's development of technology. Laboratory operations employed by the ancient pharmacist and cosmetician reveal their origin in the preparation of food; so too do the techniques of crushing or disintegration (pressing, grinding, impaction), the technology of fermentation, the methods for the preservation of perishable organic material and, the oven. The chemistry and technology of cooking were thus realms of practical knowledge which the Islamic world inherited from the ancient centres of Middle Eastern civilisation. This inheritance was not, however, shared equally by all the population. Techniques which had perhaps originated or else been refined in the kitchens of the ancient temple and the palace were appropriated by the mediaeval urban cook, whereas the rural and

nomadic populations retained the more primitive methods of food preparation. The technological gap between the urban and rural domains can be explained as a function of the distribution of power in the economic sphere and ultimately of social stratification and its ramifications in the political sphere.

Data relating to the kitchen in the classical period (*ca.* 200–800 A.H.) are found most abundantly in the specialist culinary treatises. Few of these, unfortunately, are extant. The social milieu reflected by the cookbook is clearly that of prosperous urban households, although it would be safe to assume that both palace and domestic kitchens shared a culinary lore and a range and type of utensils in common. Apart from this we know little of the operations and personnel of the palace kitchens in particular, except that they were of a far greater scale than those in the domestic sphere. For example, Hilāl al-Ṣābī reports that in the time of al-Muʿtaḍid (d. 289/902) the imperial "cook houses" (*maṭābikh*) were separate from the bakeries (*makhābiz*) and the caliph was served from his own private kitchen while the public's needs were catered to from a different one. Domestic households of a comfortable standard would have had their bread baked and food cooked in the same complex.

The concept and design of the kitchen in a traditional open courtyard house has probably remained unchanged from mediaeval times to the last surviving examples in modern-day Baghdad. Indeed, the essential characteristics of the mediaeval open courtyard house in ʿIrāḳ are said to be the Mesopotamian in origin and inspiration. The kitchen (the contemporary expression *bayt al-maṭbakh* being equivalent to the lexicographers' *bayt al-ṭabbākh* and *maṭbakh*) in multi-courtyard dwellings was a whole complex comprising the kitchen proper, opening on to its own courtyard with adjoining ancilliary areas such as store rooms, latrine and bathroom, well and possibly a cook's room. The upper part of the courtyard, level with the first floor of the house, was surrounded by blank walls and open to the sky. The kitchen of a single courtyard house faced directly on to the courtyard itself and had either fewer or no ancilliary areas attached to it. Larger multi-courtyard houses might have a second kitchen adjacent to the rooms where guests were entertained. Palaces of the caliph and the ʿAbbāsid princes were doubtless fashioned on a much larger scale but along essentially similar lines. Contrast this special function kitchen complex with Lane's description of a peasant's house in Lower Egypt in the 19th century, in which one room generally had an oven (Eg. *furn*) "at the end farthest from the entrance and occupying the whole width of the chamber. It resembles a wide bench or seat and is about breast high: it is constructed of brick and mud, the roof arched within and flat on top." During the cold months, the inhabitants would sleep either on top of a warmed oven or on the floor of the same room. Along the social spectrum, therefore, food preparation was performed in areas ranging from greater to lesser specialisation: from the separate public and private kitchens and bakehouses of the palaces to the shared kitchen-habitable area of the peasant's dwelling.

The well-equipped kitchen in an urban household generally contained two major appliances. One was the baking oven, the *tannūr*, of Mesopotamian origin (Akkadian *tinûrû*). Cylindrical and bee-hive shaped, it gave the appearance of a large, inverted pot, from which it probably evolved. Fuel, preferably good charcoal, was inserted through a side opening, ignited, and when the oven was sufficiently hot, baking could commence. The oven's temperature could be adjusted to some extent by closing its

open top, the so-called "eye" or "mouth" *fam*, and its other apertures, *aṯḫāb*. The earliest extant culinary manuscript, of late 4th/10th century ʿIrāḳī provenance, provides a list of implements specifically used in baking bread in a *tannūr*. These include a dough board (*lawḥ)*; a small rolling pin (*šawbaḳ*) for the ordinary loaf (*raġīf*) and a large one for the thin *riḳāḳ*; a feather for coating the dough in certain preparations; a wooden bowl (*ǧafna* or *miʿǧan*) in which the dough was mixed and a metal scraper (*miḥakk*) for cleaning it afterwards. Yeast was kept in a wooden container called a *miḥlab*. A cloth (*mandīl)* was used to wipe a loaf clean before baking and another was used for wiping down the oven to remove unwanted moisture or condensation. A poker (*ṣinnāra*) was used to remove the loaf from the oven if it fell upon the floor inside, and a metal instrument (*miḥrak*) was used for raking out the embers and ash from the oven when baking was finished. The *tannūr* was not used exclusively for baking bread. A recipe for a kind of chicken pie made in a pan (*miḳlā*) is described as being lowered into the oven to cook and another dish, a meat, rice and vegetable casserole made in a pot (*ḳidr*) was placed in the oven to finish cooking. Both these dishes were called *tannūriyya*, or oven-dish, which were often left to stew gently overnight in a slowly cooling oven and served the following day.

The second major cooking contrivance found in the kitchen was known simply as the "fire-place", *mustawḳad*. This was designed to accommodate several cooking pots and/or pans side-by-side at the same time. It was erected to about half-a-person's height, giving easy access to the cooking food and was provided with vents allowing for an intake of air over the coals and for the expulsion of smoke. It is evident that many dishes required more than one pot in their preparation, hence several "elements" might be used in the preparation of a single meal. Another, apparently independent, type of *mustawḳad* was recommended for the preparation of sweetmeats. Its single element accommodated a *miḳlā* or *tanǧīr*, the vessels in which sweetmeats were commonly made. These dishes required long cooking over a low heat accompanied by vigorous stirring of the pan's contents. The shape and position of this *mustawḳad* would have made it easier to hold the pan and to control the heat.

Al-Warrāḳ's depiction of the mediaeval *batterie de cuisine* continues with a list of utensils employed in the preparation of the innumerable main dishes. Cooking pots (*ḳudūr*, sing. *ḳidr*) made of stone, earthenware, copper or lead came in various sizes. The largest pots were reported to hold the carcasses of four goats. Such cauldrons, however, were more apt to be found in the palace kitchens or an army field mess than in a domestic kitchen; contemporary recipes do not suggest such crude bulk of ingredients. Judging from certain archaeological evidence, kiln pottery vessels of the "cooking pot" and "casserole" types appear more modest in size. Remains from a Byzantine pottery factory in Cyprus reveal that the largest restored cooking pot item was 0.27 m high and 0.31 m at its greatest diameter; the smallest was 0.135 m high and 0.21 at its greatest diameter. Casseroles with lip-edge type rims which were probably provided with lids were smaller still, the largest restored item being 0.11 m high and 0.27 m in diameter. These vessel sizes seem appropriate to the needs of even large domestic households.

Pans (sing. *miḳlā* or *miḳlāt*) generally used for frying fish and the like were made of iron. A stone-made *miḳlā* was used for other purposes, although the distinction between it and the former is unclear.

Other utensils found in the kitchen were roasting skewers (sing. *saffūd*); a copper basin (*nuḳra)* for washing smaller containers and vessels in hot water; a large copper rod-like instrument (*miḥashsh*) for stuffing intestines; a large knife for jointing meat and smaller ones for cutting up vegetables; several kinds of strainer (*miṣfāt*) made of wood or metal; a ladle (*mighrafa*) and a mallet (*miḍrab*). Spices were crushed or powdered in a mortar (*hāwun*) and kept in glass vessels. A similar but larger stone mortar (*djāwun*) was used for pounding meat or crushing vegetables; while meat was cut up on a wooden table or large wooden surface (*khiwān*).

As with bread-making operations, Warrāḳ lists separately implements for making sweetmeats (*ḥalwā*). Frequently these dishes were served shaped in the form of a fish or bird fashioned thus by means of a mould (*ḳālab*, pl. *ḳawālib*). In other cases sweetmeats were presented at a table decorated in a manner appropriate for the occasion. The thick syrupy substance which was the base of many kinds of *ḥalwā* was stirred slowly in a pan over the fire with utensils called an *iṣṭām* and a *ḳasba fārisiyya.* Some preparations were rolled out after cooking on a marble slab (*rukhāma*) before being cut into individual pieces. (The above data may be compared with Athenian household utensils in the classical period.)

The separate lists of utensils for different tasks mentioned in al-Warrāḳ's work suggests that at least in the larger, prosperous households both a baker and possibly a sweetmaker might have been retained in addition to a cook and other assistants. It may indeed be the case too, as Pellat has proposed, that the baker's (*khabbāz*) initial function evolved into that of a chief kitchen steward or even household majordomo. The sweetmaker, on the other hand, may have been more often a market-based specialist commissioned to make his wares in people's kitchens when the need or occasion demanded. By and large, therefore, a household's status was marked socially, in part, by its degree of independence from the commercial cooked food establishments of the market which catered more to the needs of other sections of the population. Despite allusions in the *Thousand and One Nights* to "sending out" for food cooked in the market, the *ḥisba* manuals convey the impression that such fare was to be regarded with some suspicion. This impression is underlined by the existence of one market institution which must have served many urban households. Dishes initially prepared in the kitchen could be taken to the communal oven (*furn*), cooked there and returned to the kitchen to be garnished with chopped vegetable leaves and additional spices. Preparation of such a dish in the kitchen ensured a control over its quality; for its part, the *furn* served the needs of households which possessed neither adequate kitchen space, equipment or labour for meal preparation or else catered for a household's special festive occasions. In any event, the very affluent establishments would seldom, if ever, require the services of a communal oven manager.

Although we do not possess data on the day-to-day details of kitchen management, food preparation was a time-consuming and labor-intensive process. So too were the efforts to keep the cooking pots and pans clean in order to prevent the food becoming spoiled. Al-Baghdādī's instructions in his mid-7th/13th century cookbook run briefly as follows: "The utmost care must be taken when washing the utensils used in cooking and the pans; let them be rubbed with brick dust, then with powdered dry potash and saffron and finally with the fresh leaf of citron". The opening chapter of al-Warrāḳ's work

deals with many of the causes of spoiled food and how to avoid such results. Meat must be thoroughly cleaned of any blood and washed in pure cold (not hot) water in a clean bowl; a knife used to cut up vegetables should not be used at the same time to cut up meat; spices which are old, have lost their essential flavour and have become "bitter", should not be used lest they "corrupt the pot". Likewise, salt and oil should be tasted before adding them to the cooking food so as to ensure they are still in good condition; attention must be paid to see that the liquid of stews or bits of onion and the like has not dried on the inside of pots and so might spoil the food when next they were used; and only fuel which does not give off acrid smoke should be used, as the smoke could alter the taste of the food.

Finally, the kitchen or kitchen complex of the single or multi-courtyard house (*bayt maftūḥ*) allowed a sheep or goat and several fowl to occupy the yard awaiting slaughter and the cooking pot; thus meat could be kept and cooked fresh. Fruits, herbs and certain vegetables were also dried and then stored in the kitchen's ancilliary area along with food prepared by pickling and special condiments such as *murrī*. Homemade beer and wine could be stored there as well. The wide range of activities associated with the transformation of food from its "raw to cooked" state (clearly reflected in the treasury of contemporary recipes) indicates the central importance of the kitchen and its management not only to the smooth running of day-to-day family life but also to the broader social and political aspects of food preparation and consumption which existed within the enclosed world of the domestic compound.

(D. Waines)

2. In Ottoman Turkey

In Ottoman society, *maṭbaḵh*, in vernacular Turkish *mutfak*, the kitchen, had a central importance not only because the members of the ruling élite had to feed their large retinues but also because, as a social institution, it served to establish and symbolise patrimonial bonds in society. Feeding people gave rise to a variety of elaborate organisations related to the Sultan's palace, to the élite and to the charitable institutions. By fulfilling charitable duties as prescribed by Islam and by leading to the accumulation and redistribution of wealth, these organisations played a crucial role in Ottoman social life and in the economy in general.

a. *Special feasts and foods*

Feeding people or giving public feasts had an important ritualistic-ceremonial and political function among the pastoral nomads of Eurasia. In the Kök-Türk inscriptions dated 732–5 A.D., the primary task and accomplishment of a Kaghan was described as "the feeding and clothing of his people". In the *Ḳutadgu bilig*, a royal advice book written in 1070 in Turkish, being generous and "entertaining people with food and drink" are counted among the chief virtues of a prince.

Later references to this custom indicate that "feeding his people" was institutionalised within the state organisation. To give a public feast was a privilege and a duty of the ruler. The institution was known as *toy* in Turkish (in Mongol *toyilan*), *sḧölen* (in Mongol, *sḧulen*) or *ash*. It was originally associated with the institution of a potlatch. Ögedey ordered that one sheep from each herd was to be taken annually and given to the poor. This institution was called *sḧülen*. Following his election to the khanate, Čingiz Khān had set up a kitchen as part of the state organisation. In the public feast given by the Kaghan

at the meeting of the tribal chiefs, the customarily-determined seat (*orun*) and share of mutton served (*ülüsh*) to each chief was scrupulously regulated, for this was considered a ceremonial recognition of his rank. Arbitrary change in the order and hierarchy might lead to a rebellion. At such *toy*s or *shülen*s, important issues concerning the khanate were discussed and decisions taken. The practice was apparently introduced into the Islamic world by the Saldjūḳs. Niẓām al-Mulk speaks of it as a custom, scrupulously observed by the Saldjūḳs; Ṭoghrïl Beg held an open eating table in his palace every morning. Because it was interpreted as a proof of the ruler's care for his subject, he was personally interested in the quality of the food served. The Ḳarakhānids, says Niẓām al-Mulk, considered *toy* an important state affair. Early Ottoman traditions, tell us that in the Ottoman palace it was the custom for a band to play every afternoon to invite people to come and eat. At any rate, it was a carefully observed custom to offer, in the second court of the Ottoman palace, food to anyone who came to submit a case to the imperial council.

The Ottoman also followed the Islamicised forms of the ancient Iranian rituals of *Mihragān* and *Nawrūz* which became occasions for public festivities. The offering of *pīshkash* or presents by high official and governors to the Sultan at such times was an occasion for the renewal of bonds of loyalty, as had been the case in ancient Iran. The 21st (in the old calendar, 9th) of March was accepted by the Ottomans as *nevrūz* (*nawrūz)* or the beginning of the new year. On that day, it was a widespread custom to eat and offer a special paste, *maʿdjūn*, called *nevrūziyye*. *Nawrūz* was also the beginning of the fiscal year in the Ottoman financial calendar.

Festivals of Iranian origin were, in the course of time, identified with the memorable events of Islam. For Bektāshīs, *nawrūz* is the most important festival, celebrated with a special feast, since 9 March is believed to be the birthday of ʿAlī. It is a religiously meritorious act to celebrate nights of special importance in the history of Islam. The night of the Prophet's birth, 12 Rabīʿ I, as well as those of *raghāʾib*, 3 Radjab; of the prophet's *miʿrādj*, 27 Radjab; of *barāʾa* or *barāt*, 15 Shaʿbān; and the *laylat al-ḳadr*, 3 Ramaḍān, are celebrated with special prayers. After prayers, special dishes or sweets (*ḥelvā*) are offered which are an important part of the ritual: special *wakf*s called *ṭaʿāmiyye* were established specifically for the distribution of food in the *zāwiye*s and *ʿimārets* on these days. The day of *ʿāshūrā*, 10 Muḥarram, had special meaning for the *ṭarīḳa*s of Shīʿī tinge. It was the occasion of a ritual at the derwish convents, the elements of which were reminiscent of the ancient Iranian *nawrūz* ritual. The preparation of a special food for the day called *ashūre* (*ʿāshūrā*) at the convents had its own elaborate ritual. The day of *ʿāshūrā* was observed commonly by all classes of society, including the Sultan's palace.

During the month of Ramaḍān, it was a custom for the Sultan and the principal dignitaries to invite their subordinates to the *iftār* meals in the evening, which were occasions for the renewal of the *nisba* or patrimonial relations among the élite. Special dishes were expected at the *iftār* meals. The introduction of a Western menu in the 19th century drew criticism regarding this. On the *ʿĪd al-aḍḥā,* Turkish *Ḳurbān bayramı*, thousands of sheep were slaughtered and distributed to the poor by the Sultan and well-to-do citizens. Offering sweets was customary at the *ʿĪd al-fiṭr*.

Also on special occasions, such as the Sultan's accession to the throne, a major victory on the battlefield, weddings or burials, elaborate public feasts were given

which in their size and character resembled old Turkish *toy*s.

The festival of Khiḍr-Ilyās, in vernacular Turkish *Hidrellez*, celebrated universally in the Ottoman lands, was also an occasion for a communal ritual feast usually called *tafarrudj*. Like *nawrūz*, it was associated with a cult celebrating the beginning of spring with the difference that *Hidrellez* was celebrated on 6 May (or 23 April). It is to be noted that the Christian festival of St. George, who was identified with Khiḍr, was held on the same day.

The *ḥalwā* (Turkish *ḥelvā*) gathering, celebrated on 1 May, is a ritual related rather to the *futuwwa* tradition of the craft guilds and the *ṭarīḳa*s. Ritual foods, *tuz-ekmek*, *sherbet*, *loḳma*, *ḥelvā*, were all prepared and served ritually along with suitable prayers.

In general, ritual food signified submission and mystical union in the *ṭarīḳa* ceremonies. The Janissary corps was symbolically organised on the model of a kitchen. The explanation may lie in the *futuwwa* and Bektāshī connections of the corps, or in the old Turkish custom of *toy*. The *ḳazān-i sharīf*, or sacred cauldron of *čorba* (soup), attributed to Ḥādjdjī Bektāsh was the emblem of the whole Janissary corps. The Janissary headgear was ornamented with a spoon. High officers were called *čorbadjï*. Also, each *orta*, or division, had its own *ḳazān*, and the head cook of the *orta* kitchen was the most influential officer in the division. The kitchen was also used as a detention place. Important meetings were held around the *ḳazān-i sharīf*. Overturning it meant rejecting the Sultan's food, i.e. rebellion, whilst to accept one's food meant submission in general.

b. *The* Maṭbakh-i ʿĀmira *or Palace Kitchen*

In addition to visitors, there was in the Sultan's palace a large body of palace servants who had to be fed every day. In 933/1527 servants in the *Bīrūn*, Outer Service, alone, numbered 5,457. The annual account books of the New Palace (the Ṭopḳapï Palace) list separately the following kitchens: the *Maṭbakh-i ʿĀmira*, or Imperial Kitchen; the *Ḥelwākhāne* (formerly *sherbet-khāne*, confectioner's kitchen); and the two bake-houses for *simid* and *fodula*. Within the *Maṭbakh-i ʿĀmira* itself, reference is made to particular kitchens: *Maṭbakh-i Āghā-yi Saray* (K. for the Chief Eunuch of the Palace), the *Maṭbakh-i Āghāyān* (K. for the Chief Eunuchs), and the *Maṭbakh-i Ghulāmān-i Enderūn* (K. for the Palace pages). A special kitchen called *ḳushkhāne* (not to be confused with the Palace aviary) was reserved exclusively for the Sultan himself. The entire southern part of the Second Court in the Palace was occupied by kitchens, storerooms, apartment for the Kitchen personnel and offices. After a destructive fire, ten kitchens were rebuilt under Süleymān I by the architect Sinān, who created a grandiose construction with domes and chimneys. Each of the ten kitchens served a special group.

There were two storehouses, *kilār* or *kiler*, one in the *Bīrūn*, the other in the *Enderūn* (*Andarūn*) where provisions for the Palace were stored. The more valuable items such as sugar and spices mainly provided from Egypt were preserved in the inner *kiler* under the direct supervision of the *kilerdji-bashi*. The bulkier goods were stored in the outer *kiler* under the supervision of the *Maṭbakh kilerdjisi*. Other palaces in Istanbul, such as the Sarāy-i ʿAtīḳ, Üsküdār Sarāyï and Ghalaṭa Sarāyï, and the palaces in Edirne and Bursa, had their own kitchen organisations similar to those of the Ṭopḳapï Palace. During the classical period (1400–1600), all the work involved in the procurement of provisions and the preparation and distribution of food within the Palace was under the responsibility of

the *kilerdji-bashi*, also known as *sar-kilārī-i khāṣṣa,* or the Head of the Imperial Larder. He was the chief of the third of the Imperial Chambers which were in direct contact with the Sultan. The staff under the *kilerdji-bashi* grew considerably over the course of time, from 20 in the early 16th century to 134 in 1090/1679. The cooks, *āshdji*s or *ṭabbākh*s, were organised in an *odjaḳ* (corps), which was divided into *bölük*s, in the same way as other military corps at the Porte. The corps was headed by the *sar-ṭabbākhīn-i khāṣṣa,* also known as *bash-āshdji-bashi* with the rank of *āghā.* As in other corps, the *āghā* was assisted by a *katkhudā* (lieutenant) and a *kātib,* secretary. As professionals, the cooks were subjected to a hierarchy as in any craft, which consisted of *usta* or *ustād*, *ḳalfa* or *khalīfa,* and *shāgird* (master, foreman and novice). As a rule, a *shāgird* joined the corps from the corps of *ʿadjemī-oghlan*s. He learned the profession while working under an *usta* or *āshdji-bashi*, later becoming an *āshdji*, then being promoted to *āshdji-bashi.*

Servants under the *kilerdji-bashi* in the storerooms in the *Bīrūn* formed a separate corps in ten *bölük*s. Under him were the following: *khabbāzān* (bakers), *ḳaṣṣābān* (butchers), *ḥalwādjiyān* (*ḥelvā*-makers), *yoghurtdjiyān* (yoghurt-makers), *sebzedjiyān* (keepers of vegetables), *simiddjiyān* (makers of ring bread), *buzdjiyān* and *ḳardjiyān* (keepers of ice and snow), *ʿashshābān* (keepers of herbs), *tavukdjiyān* (keepers of poultry), *ḳalaydjiyān* (tinners of the copper utensils), *mūmdjiyān* (makers of candles), *sakkāyān* (water-carriers), *gandum-kūbān* (wheat-pounders). *Čashnīgīrān* (waiters), made a completely independent group under a *čashnīgīr-bashi* in the *Bīrūn* section. The Sultan was served by the *kilerdji-bashi* and his staff in the *Enderūn.*

The Sultan's cooks competed to please the Sultan by preparing special dishes of their own cooking. The Sultan showed his pleasure by giving a reward (*inʿām).* Thus the Ottoman palace was considered as a centre where Ottoman Turkish cooking excelled and where creative chefs were trained. Detailed records on the ingredients used are to be found in the kitchen expenditure books.

Provisions were to be supplied regularly to the imperial kitchens under the supervision of a *maṭbakh emīni*, who organised their delivery. Also responsible for book keeping and accounts, he was assisted by a *katkhudā*, two *kātib*s (scribes) and a larder attendant (*kilerdji*). A bureaucrat of the rank of *khʷādje*, the *emīn* was nevertheless a dependent of the *kilerdji-bashi*. Provisions were bought either from the market or as *irsāliyye* or *odjaḳlïḳ* procured regularly from the resources under the control of the finance department.

The tremendous amount of meat consumed at the imperial palaces give rise to a vast organisation under a *ḳaṣṣāb-bashi*, who was financially dependent on the *maṭbakh emīni*. For the kitchens of the Topkapı Palace alone, the annual consumption of lamb was about 1,270 tons, costing 12 million *akčas*. The other three palaces consumed 458 tons annually.

The organisation of the kitchen in the houses of the élite was a miniature replica of the Sultan's one. It included two separate kitchens, one for the lord and the other for the servants. Both had master cooks (*usta*) and apprentices or assistants (*shāgird*). In 1082/1671 a vizier-governor, ʿUmar (ʿÖmer) Pasha's kitchen personnel consisted of one *maṭbakh emīni*, also known as *wakīl-khardj*, six cooks, six pantrymen (*kilārī*), two shopping boys and one butler. Expenditure for provisions through the *wakīl-khardj* amounted to about 8,600 gold pieces or 16.7% of the Pasha's total expenditure. Members of the élite spent an unusual amount of money for kitchen expenses, not only because they had large

retinues to feed (in ʿUmar Paşha's case, 220 persons) but also because they were expected "to keep the house open" to visitors.

In the houses of the élite and well-to-do, the *maṭbaḵh* and the *furūn* (oven) were to be found often as separate constructions in the courtyard.

c. *The* ʿImāret *and* Zāwiye

The *ʿimāret*s functioned as an extensive network of social aid in Ottoman society, particularly in the cities. Numerous *ʿimāret*s provided food for thousands of people who did not have an independent source of income. Charity, materialised through the institution of *ʿimāret*, was accepted as an integral part of the Islamic *wakf* system, but considered extensively, the ʿimāret system might also be related to pre-Islamic Turkish traditions.

Through this system, the immense wealth, which was accumulated in the hands of the ruling élite, was redistributed among the unprivileged and dependent people. Built within a religious complex, an *ʿimāret* compound usually included a *maṭbaḵh*, a *ṭaʿām-ḵhāne* or *dār al-ḍiyāfa* (eating hall), *ḥuǰras* (rooms for visitors), an *anbār* or *kilār* (larder), a *furūn* (oven), an *iṣṭabl* (stable) and a *maḥṭab* or *odunluḳ* (store for firewood). The entire *ʿimāret* compound was put under a *şhaykh-i ʿimāret*, while each section came under the responsibility of an employee specialising in that service. The *Maṭbaḵh* personnel of a large *ʿimāret* included first a *wakīl-ḵharǰ* (steward), *kilārī* (larder attendant), *anbārī* (keeper of the storeroom for bulky provisions), *naḳībs* (distributors and supervisors), *ṭabbāḵhs* (cooks), a head cook, and *ḵhabbāz*s (bakers); in the second category came a *gandum-kūb* (wheat-pounder), a *kāse-şhūy* (bowl-washer), *ḥammāls* (porters) and *bostānī*s (gardeners). There were also *ḳapı̊ǰı̊*s (gate-keepers), *teberdār*s (halberdiers), *āḵhūrī* (stable boy), *čirāghdǰı̊* (candlelighter), *kāse-keşkh* (waiter), *ferrāşh* (sweeper) and *mezbele-keşh* (carrier of garbage). At smaller *ʿimārets* or *zāwiye*s, there were to be found only a *şhaykh*, cooks, bakers and a store-keeper. At the derwish *zāwiye*s, the main services were assumed by the *babas* and others by dervishes, in a hierarchical order. According to the Ṣūfī interpretation, each service represented a station in the training of a disciple. In the Bektāşhī order, the *ekmekdǰi-baba* and *āşhdǰı̊-baba* came second and third after the *pust-nişhīn* in the hierarchy, which corresponded to the *ekmek-evi* and *āş-evi* in the *tekke*. The administrators comprised a *mutawallī* (trustee and administrator), a *nāẓir* (supervising trustee), a *kātib* (secretary) and *ǰābī*s (collectors of revenues). All this gives an idea of how an *ʿimāret* or *zāwiye* was organised and functioned.

The word *ʿimāret* is sometimes used synonymously with *ḵhānaḳāh* or *zāwiye*; but in all categories, the running of a *maṭbaḵh* and cooking and distributing food for the needy constituted the most important function.

*Imāret*s founded by the sultans in large cities were the most developed form of public soup kitchen. The *ʿimāret* of Fātiḥ, part of the charitable complex established by Meḥemmed II, had an annual income of about 20,000 gold ducats. This income was derived from 57 *wakf* villages and the *ǰizya* tax of the non-Muslims (8,677 taxpayers) of Istanbul. At least, 1,117 persons received food from this *ʿimāret*. The figure included 957 students, employees and servants of the *ʿimāret* and 160 travellers. For better service, a *tawzīʿ-nāma*, or regulation for distribution was drawn in 952/1545. The food, when left over, was further distributed among the poor in the neighbourhood, with widows and orphans getting priority. Those benefiting from an *ʿimāret* are listed, in order, as the *fuḳarāʾ* (destitute) coming first, and then *masākīn*

(those unable to make a livelihood) and *musāfirīn* (travellers). Sometimes poor orphans (*yatīm)* and school children are also mentioned in the *wakf* deeds among the beneficiaries. Dervish *zāwiye*s are included in the category of establishments which offer food and shelter to travellers and the needy. In the documents granting arable land as *mulk/wakf* to the *shaykh* of a *zāwiye*, it is always stipulated that his primary duty is to provide food and shelter to travellers. In the countryside, the *zāwiye* was thought indispensable for people travelling and a factor promoting settlement and prosperity. Anyway, helping travellers was included among the *zakāt* duties and the performance of this duty in the name of the Sultan was given to the care of a dervish community, as an old Islamic tradition. The *zāwiye*s of the *akhī*s were particularly active during the first period of Ottoman expansion and settlement, when hundreds of *zāwiye*s and similar institutions were established throughout the empire; in 936/1530 there were 626 *zāwiye*s and *khānaḳāh*s, 45 *ʿimāret*s, 1 *ḳalender-khāne* and 1 *mevlevī-khāne* in the province of Anatolia (western Asia Minor).

As a rule, a *zāwiye* encompassed two sections, a *tekke* (convent), where the dervishes performed their religious rites, and a *maṭbakh* or *āsh-evi*, where food was prepared and distributed to the dervishes, to travellers and to the needy. The *maṭbakh* was considered so important that usually it dominated the whole *zāwiye* structure, and took up by far the largest share of the *zāwiye*'s revenue. In the urban *zāwiye*s, the residents of the quarter where the *zāwiye* was built set up additional *wakf*s to supplement the salaries of the servants or to pay for the preparation and distribution of food on holy days (*ḳandīl*s). Thus the *zāwiye*, like the mosque of the quarter, constituted a common religious centre as well as a charitable institution in the *maḥalla*.

(Halil İnalcık)

3. In Persia

The Persian word for kitchen *āshpazkhāna*, was not in general used before the 19th century, though the terms *āsh* "soup" and *āshpaz* "cook" do occur in earlier texts. Before the Ḳādjār period, the Arabic *maṭbakh* was the common term for kitchen.

A tradition with a long history, Persian cuisine ranks, with that of the French and the Chinese, as one of the great cuisines of the world. Its origins and influences are to be sought in the East, and more specifically in Transoxania. The traditional use of wheat as a staple and the basis of vegetable soups (*āsh*), the mixing of meat and fruit in dishes, the use of various types of yoghurt (*mast* and *kashk*) and other dairy products, and ways of preparing meat, all point to Central Asian origins. Conversely, olives and olive oil, so abundant in the Mediterranean and Ottoman Turkish cuisine, are virtually absent in Persian cooking (except in the Caspian provinces); Persians traditionally cooked with animal fat (except for Jews, who used sesame oil). The important place of rice in Persian cooking similarly suggests Asian origins, in this case Southeast Asia and India.

Legend ascribes the art of cooking to Ahriman (the Zoroastrian spirit of evil) who is said to have taught a mythical King Zahāk to prepare the flesh of animals. It is mainly Greek texts that offer some information on royal banquets, but otherwise we know little about food and ways of preparing it during the Achaemenid period, though borrowings from Lydia and Assyria seem plausible. The situation for the Sāsānid period is a little better, with information and recipes being

available on the high cuisine of the court, including ingredients such as various types of hot and cold meat, stuffed vine leaves and sweet date purée. The first five centuries of Islamic rule are again rather poorly documented. The available information, mostly from Muslim travellers and the occasional literary source, points to a heavy reliance on bread and cereals, an important role for (roasted) meat, including game, especially for nomads and soldiers, and the use of condiments such as pickled vegetables (*turshī*), sour grapes (*ghūra*), dried lemons and walnuts, which would remain essential to Persian cooking. It is only in the Mongol period that the current Persian cuisine became heavily influenced by Eastern traditions and took its current shape. Rashīd al-Dīn, who first entered Mongol employ as a head cook in the household of the khān and who later employed a Chinese cook in his own household, may have been instrumental in the transmission of Chinese cuisine to Iran.

The first period for which we have abundant information on eating and cooking practices is that of the Ṣafawids. European observers were struck at the frugality of eating habits. Chardin was among those who noted how Persians skipped breakfast except for a cup of coffee and only ate two proper meals a day. Food was cooked in earthenware or copper pots coated with tin. In areas where wood was scarce, such as the central plateau, cooked food was eaten at most only once a day, in the late afternoon, and instead of cooking, people in urban areas would get their pilaw and the ingredients for their soups from the ubiquitous cookshops. During other meals, bread and cheese were the main ingredients. Meat included mutton and goat. Chicken and pigeon were also part of the menu of those who could afford it. Beef was rarely eaten. Chardin's observation that beef, tough and dry, was only eaten by the poor in winter is echoed for the 19th century by Polak and Wills. Even today, Persians do not favour beef, except those living in the Caspian provinces. Nor did game enjoy much popular appeal in Ṣafawid times, despite the enthusiasm for hunting on the part of the élite, in part because of the difficulty of abiding by ritual slaughter, in part because of its taste. Game was often given as a present to Christians, who loved it as well as dark meat and fish. Turkey flesh seems to have caught on very slowly after its introduction from the New World via Europe. Olearius claimed in the 1630s that turkey was not among the birds eaten, though under Shāh ʿAbbās I a Venetian merchant had once brought a few to Iṣfahān. A generation later, Tavernier wrote that the Armenians had brought turkeys and ways of raising them to Persia, adding that the meat was only for the court. Some sources claim that horseflesh was the most esteemed type of meat. The predilection for horseflesh at the court of Tīmūr and the fact that the *Mihmān-nāma-i Bukhārā* calls it the most delicious meat, point to a Central Asian origin of the taste. Polak suggested regional variation by saying that Persians did not eat horseflesh with the exception of the people from Shīrwān and the Özbegs, who considered it a delicacy. Fish, not an ingredient of the nomadic diet, was naturally mostly confined to the Caspian coast and the Persian Gulf littoral, though trout from the Caspian region was also served at royal banquets.

The information that has come to us from Ṣafawid times mostly concerns the food of the rich and eating practices at the royal court, as described by Western visitors who enjoyed the hospitality of the shāh and administrative officials. They offer information on the royal kitchen as

well as on the types of food consumed at the court.

The royal kitchen prepared food only once a day for the royal household but twice a day for the shāh himself and his direct entourage. The daily food outlay for the shāh amounted to two sheep, four lambs, and thirty chickens for his midday meal and half as much for his supper, not counting small poultry, game and fish.

The royal kitchen was supervised by the *tūšmāl-bāšī*, an official who was subordinate to the *nāẓir al-buyūtāt*, the steward of the royal household. The *tūšmāl-bāšī* was responsible for the quantity and quality of the meat served at the court, preceded the procession of the meat dishes all the way from the kitchen to the royal quarters, and also acted as the royal taster (the *mihtar* "chamberlain" would taste all royal food a second time). Another important official was the *sufračī-bāšī*, who was in charge of arranging the floor cloth (*sufra*) on which food was consumed. Other officials working in the royal food and drink department were the *ḳaṣṣābčī-bāšī or sallākhčī-bāšī* "the butcher", the *ḥawīǧār-bāšī*, who supervised the poultry yard and the scullery, the *sabzičī-bāšī*, who was responsible for green salads, the *turšīčī-bāšī*, who supervised the preparation of pickled vegetables, the *ḥalwatčī-bāšī*, or confectioner, the *šarbatčī-bāšī*, or supervisor of the sherbets and syrups, the *ābdār-bāšī*, who was in charge of drinks, and the *ḳahwačī-bāšī*, who headed the department of coffee making.

Meat was often eaten in the form of kababs, which Fryer described as "rost-meat on skewers, cut in little round pieces no bigger than a sixpence, and ginger and garlic put between each". The same author notes that it was most often made into a pilaw, "their standing dish".

Rice had become an important ingredient in élite cookery after the Mongol domination of the country, gradually edging out pasta and groats (*bulghur*). Though it is not clear whether rice was grown in Persia before the advent of Islam, it has been part of the Persian diet since Sāsānid times. At least since early Ṣafawid times, Persians have eaten rice in various ways, either as chilaw or as pilaw. Unlike the situation in parts of China and India, where rice is a staple and a basic nutrient, in Persia rice has always been a prestige food and a luxury item not eaten by the poor on a regular basis. Its preparation has always been accordingly complex and time-consuming. Cooking is the same, involving a laborious process of soaking and steaming, resulting in rice that does not stick together, but the main difference is that chilaw consists of rice and clarified butter and sumac, which, served with kabab, a raw onion or herbs, has become in modern times a favourite restaurant meal. Pilaw, on the other hand, is rice mixed with a variety of ingredients. Fryer describes the making of pilaw as follows : "To make pullow, the meat is first boiled to rags, and the broth or liquor being strained, it is left to drain, while they boil the rice in the same; which being tender, and the aqueous parts evaporating, the juice and gravy incorporates with the rice, which is boiled almost dry; then they put the meat again with spice, and at last as much butter as is necessary, so that it becomes not too greasy or offensive, either to the sight or taste; and it is then boiled enough when it is fir to be made into gobbets, not slabby, but each corn of rice is swelled and filled, not burst into pulp." Rice with lamb was the most common form of pilaw, but it was also prepared in numerous other ways, with spinach or cabbage, with roasted or boiled meat, with almonds and raisins, with onion and garlic, and it was served in various colours, depending on the condiment,

which could be currant, pomegranate or saffron. Chardin noted five or six different pilaws during a meal served by Shāh Sulaymān for a Russian envoy, with garlic crust, lamb, chicken, eggs stuffed with meat, and with fish. He also gave more than twenty as the total number of pilaw varieties. Twenty-five kinds of pilaw are mentioned in a Persian source from the Ṣafawid period.

Then as now, meals were consumed synchronically; unlike French cuisine, there was no time sequence to the order of eating the food and courses are not divided. Kaempfer, describing a royal banquet, noted, however, that confection and sweetmeats tended to precede the main course. All Europeans commented on the silence observed during meals, their short duration, and the fact that nothing was drunk until afterwards. They also noted that no silverware was used, except for a large wooden spoon that was used for eating soup and drinking the various juices that were served as part of the meal. While ordinary Persians ate from porcelain or earthenware, at the court gold dishes were abundantly used as well. Kaempfer estimated the total value of the royal dishware at 10 million gold ducats. *Ādjār* and *turshī* (pickled vegetables) served as condiments. Kaempfer describes the desserts served on the occasion of an audience: candied fruit, fresh fruit, various kinds of cake and sweetmeats. Jam, *murabbaʿ*, was very popular and came in many varieties. Sugar was used in great quantities in the ubiquitous confectionery. According to De Bruyn, the Dutch East India Company annually brought 12,000 packs at 150 pounds each to Iṣfahān.

Common people ordinarily consumed bread, vegetables and fruit. Bread has always been the staple for the overwhelming majority of the population, and its central role in the diet is reflected in popular expressions and folklore. The Caspian region, where bread has been spurned as unhealthy until modern times, is an exception. Types of bread used in Ṣafawid times were remarkably similar to the ones eaten today; such as *lawash*, thin unleavened bread that doubled as a spoon and a napkin, and *sangak*, long bread baked on pebbles. Herbert noted how dates preserved in syrup mixed with buttermilk was seen as a precious food. He called the cheese dry, blue and hard, as being worst on the Gulf coast and best in Māzandarān. Butter came from the tails of sheep. Nothing like restaurants existed. However, given the prohibitive cost of burning wood, many people ate at the ubiquitous public food stalls, *dukkān-i ṭabbākhī*, where simple hot rice dishes were prepared.

Persia had since early mediaeval times been a crossroads for vegetables and fruits, serving as a source of diffusion or an east-west conduit for such plants and crops as sugar cane, lemons and sour oranges, spinach and eggplant. In the Ṣafawid period, the movement was generally in the opposite direction. Europeans introduced parsley, asparagus, artichokes and cauliflower into Persia, and these were cultivated in the vegetable gardens of Shīrāz and Iṣfahān.

The first cookbooks—as opposed to texts in which food is described for its medicinal use—also date back to the Ṣafawid period. Of the two that have come down to us, one, called *Kārnāma dar bāb-i ṭabbākhī wa ṣanʿat-i ān*, dates from the time of Shāh Ismāʿīl I (early 16th century) and was written as a gift to a nobleman. The second, *Maddat al-ḥayāṭ. Risāla dar ʿilm-i ṭabbākhī*, was probably written for Shāh ʿAbbās by his chief cook, Nūr Allāh, who may have been a descendant of Muḥammad ʿAlī Bāwarčī, and was perhaps even commissioned by the ruler. It

is likely that both were composed for colleagues in the profession rather than as collections of recipes to serve as guidelines for the cooking of common people. For the Ḳādj̲ār period, we have the informative *Sufra-i aṭ'ima*, a compendim of cooking and eating practices written for Nāṣir al-Dīn Sh̲āh's personal physician, the Frenchman Tholozan, by the royal cook.

The menu in Ḳādj̲ār times does not seem to have differed greatly from that in the Ṣafawid period. Persian sources as well as foreign observers still note the bread and the cheese, the chilaw and pilaw, the *āsh̲* and the *āb-i gush̲t*, the various legumes, such as beans, cucumbers, aubergines (egg plant), in addition to carrots, turnips, radishes and cabbages, as well as condiments in the form of *turshī*, and the prodigious quantities of fruit. Confectionery, too, continued to be an indispensable part of the Persian diet. A new feature was that food items originating in the New World, such as tomatoes and potatoes, began to make modest inroads into the country's kitchens. Potatoes, which were apparently introduced into Persia in the 18th century, were long called *ālū-yi Malkum* "plums of Malcolm", after the British envoy Sir John Malcolm, who is commonly but probably erroneously throught to have brought potatoes to Persia. Though potatoes were cultivated in Persia, Muslim Persians in the early 19th century did not particularly care for them, and they mostly served the Armenian population and European residents. This changed during the famine of 1861–2, when potatoes suddenly became popular as a substitute for scarce cereals. Strawberries, too, were gradually coming into cultivation in the late 19th century. Turkey at that point had become slightly more common, as had small game such as quail, partridge and pheasant, though these still only appeared on the tables of the rich. The Caspian provinces continued to stand out for their different diet, including rice and the consumption of garlic, which was thought to neutralise the humid air. Public cookshops, known from the Ṣafawid period, continued to exist all over Ḳādj̲ār Persia, yet the first places resembling real restaurants only opened their doors at the turn of the 20th century. Mostly patterned after Russian and Caucasian examples, with terraces and gardens, they first appeared in Tehran.

Rich and poor naturally continued to eat differently both with regard to table manners as to ingredients. Beginning with the court, members of the élite began to adopt western cutlery in the late Ḳādj̲ār period, and the habit of sitting around a table on chairs was introduced in the early 20th century as well. The rich used imported sugar while the poor made do with syrup and honey. The rich consumed different kinds of pilaw and *kh̲ūrish̲*, stews, with lamb meat, fowl or fish. The middling classes did not ordinarily eat pilaw and *kh̲ūrish̲* more than once or twice a week, but mostly had to satisfy themselves with *āb-i gush̲t* (a stew on the basis of mutton stock, which seems to have become the staple of the poor in the course of the 19th century). The poor ate mostly bread (and in times of scarcity, even acorn bread), cheese and fruit, could afford *āb-i gūsh̲t* only occasionally, and in the winter months rarely were in a position to eat any meat. They served pilaw and *kh̲ūrish̲* only during holidays and festivals. All ate large quantities of fruit, which was cheap. Fish was a staple in the Caspian provinces, and dried and salted fish was also consumed inland. Fresh-water fish was little esteemed. On the Persian Gulf coast, prawn, *mīgū*, was eaten fresh, as it still is today; it was transported inland in dried form.

Even today, chicken and turkey connote the food of the rich, while bread

and cheese stand for the fare of simple folk. Bread continues to be the staple of the peasants and the urban poor in the arid and semi-arid interior, while rice is consumed by everyone in areas where it is cultivated, especially along the Caspian Sea. Elsewhere, rice is often still a luxury food, eaten on special occasions and offered to guests. With rising living standards, rice has become more common. Meat, formerly a food reserved for special occasion, has become much more standard as well, and traditionally vegetarian dishes such as *khūrish* are now often served with meat. Beef has made inroads, necessitating its importation in large quantities and at great cost. The inhabitants of the Caspian provinces, and especially Gīlān, still enjoy a different diet. They eat rice, mostly in the form of *katih*, quickly prepared rice with clarified butter, with every meal, and as recently as the 1970s rice constituted from 45% to 65% of the daily diet of males in central Gīlān. They also like beef, and bread used to be unknown or at least spurned by them until quite recently.

The growing Western influence in the second half of the 20th century has led to the introduction of a number of new foods, most of them pale renderings of originally Western food. Often consumed as tokens of modernity, these include sausages, *kalbas*—until the Islamic Revolution prepared with pork—hamburgers and pizzas. During the reign of Muḥammad Riḍā Shāh Pahlavī, Iranians also took to eating frozen meat imported from Australia and New Zealand, and processed "Danish" cheese. The American-style "fastfood" restaurant, serving sandwiches, pizzas, hamburgers, and fried chicken, made its appearance in the late 1960s, followed by a variety of ethnic restaurants in the next decade. Soft drinks began to replace traditional juice beverages in the same period. The period following the Islamic Revolution did not fundamentally change this process. Hamburgers, pizza and hot dogs are now consumed by people from all classes in restaurants and pizzerias that imitate Western models. A new development is the appearance of self-styled "traditional" (*sunnātī*) restaurants and coffeehouses where waiters in "authentically Iranian" dress serve the customers.

Other changes have occurred as well. Many traditional dishes, time-consuming to make, are no longer prepared on a regular basis, and traditional cookbooks, a few of which are known from the Ḳādjār period, were replaced in the 20th century by modern ones, the use of which remains unclear in a country where most women still learn the art of cooking from their mothers and grandmothers.

(R. Matthee)

4. In Mughal India

It is not easy to determine to what extent the Mughal commissariat perpetuated earlier Indian models: consistent information comes only from the times of Akbar and his successors, and although there are copious references to banquets from earlier reigns, and some allusions to favourite articles of food, there is almost nothing recorded about kitchen organisation.

Under Akbar, the Imperial kitchen, *maṭbakh* (called in Humāyūn's time *bāwarčī-khāna*), including its dependent branches of *ābdār-khāna* (the court water-supply), *mēwa-khāna* (supply of fruits both fresh and dried) and *rikāb-khāna* (pantry, specially where bread is prepared), was one division of the imperial household under the control of the Khān-i Sāmān. The kitchen itself was controlled by a *mīr bakāwal*, on whose staff were several assistant *bakāwals*, a treasurer and his assistants—for the kitchen estimates and accounts were kept separately—clerks, marketers, a large retinue of cooks "from all countries", food-

tasters, table spreaders and servers, and perhaps most important, a large number of storekeepers, for the Imperial Kitchen had to be ready to move a day in advance of the Emperor when he went on tour.

The *mīr bakāwal* was required, according to the *Ā'īn-i Akbarī*, to prepare both annual and monthly estimates for his department, to determine the rates of materials required, and to make the necessary purchases, entering all these in a day-book; he had also to pay the monthly wages of the staff. Provisions such as rice from various sources, other grains, *ghī* (clarified butter), live goats and sheep, ducks and fowls, etc., were collected at the beginning of each season (doubtless to take advantage of seasonal fluctuations in prices); the livestock would be fattened under the care of the cooks; a kitchen-garden was also established to provide a continual supply of fresh vegetables. Livestock was slaughtered outside the city or camp by a river or tank, and the meat washed and sent to the kitchen in sealed sacks; within the kitchen it would again be washed in selected water taken from sealed vessels before being cooked. During the cooking processes, in which every dish would be under the supervision of one of the sub-*bakāwal*s, awnings would be spread and lookers-on carefully kept away; the finished dishes, after being tasted by the cooks and the *bakāwal*s, would be served in utensils of gold or silver, tinned copper or earthenware, tasted by the *mīr bakāwal*, tied up in cloths and sealed, with a note of their contents, before being sent to the table; as an additional precaution a storekeeper would send also a list of the vessels used, so that none of the dishes might be substituted by an unauthorised one, and the used vessels had to be checked against the list when they were returned. As the food was carried from the kitchen by the *bakāwal*s, cooks and others, guarded by mace bearers, a similar procession would be sent from the bakery, the *ābdār-khāna*, and the *mēwa-khāna*, all dishes again sealed by a *bakāwal*. Some dishes from the Imperial table might be sent, as a mark of special favour, to the queens and princes; but of course the kitchen was kept busy the whole time, apart from the meals required for the emperor's table, in providing meals for the *zanāna*.

The water of the Ganges had a special reputation for purity, and here perhaps pre-Mughal usage is perpetuated in that Muḥammad b. Tughluḳ is known to have used special couriers to bring Ganges water to his court; Akbar while at Āgra or Fatḥpur Sikrī is said to have obtained Ganges water from Sōrōn, a town of some antiquity now no longer on the main channel of the Ganges, and while in Lāhawr from Hardwār. His practice was followed by later Mughal rulers. This was used for drinking water; but even water for cooking purposes had a small amount of Ganges water mixed with it. Trustworthy persons drew the water and despatched it to court in sealed jars. Drinking water was at first cooled in sealed containers stirred in a vessel containing a solution of saltpetre, although after the court moved to the Pandjāb, ice was regularly used, brought from the Pandjāb hills by land or water. For all these arrangements the *ābdār-khāna* was responsible, and also for the provision of *sharbat* when required; indeed, in the reign of Djahāngīr the *ābdār-khāna* was known as the *sharbat-khāna*. On the march or in camp, drinking water was cooled by being carried in a tinned flask covered with a cloth wrapping which was kept constantly moist, so that the contents were cooled by evaporation from the surface, as in the modern army water-bottle (the evidence of Mughal paintings shows a simpler method, still in use: the water is kept in a large earthenware vessel (*surāhī*),

only lightly glazed or unglazed, mounted on a simple stand and placed so as to catch any breeze).

The *mēwa-khāna* received much attention from the Mughal emperors. Bābur, in a touching passage in the *Tūzuk*, recalls the delights of the grapes and melons of his homeland and regrets their absence from India; but such luxuries were later regularly imported after the conquest of Kābul, Ḳandahār and Kashmīr, and Akbar settled horticulturists from "Īrān and Tūrān" for the cultivation of fruit trees in India. Abu 'l-Faḍl gives a list of some two dozen imported fruits and nuts, three dozen native Indian sweet fruits, and a score of sour and sub-acid fruits. A special "fruit" described in this section is the *pān*, a heart-shaped green leaf smeared with lime and catechu, to which is added slices or granules of betel-nut with aromatic spices, sometimes camphor, musk, or costly perfumes, and rolled into a *bīṙā*, which may then be finished with silver or even gold leaf. A *pān* was often presented to a courtier as a mark of royal favour, and Mughal brass *pāndān*s, with compartments to hold the leaves, nuts and other requisites, were also presented as gifts.

Abu 'l-Faḍl's account shows further what kinds of dishes were prepared for the Imperial table, and he gives thirty specimen receipts—or rather lists of ingredients, since there is no information about the cooking processes involved. These are divided into three categories: *bē-gōsht* (meatless), "commonly called *ṣūfiyāna*"; *gōsht bā-birandj*, meat with rice; and *abāzīr*, spiced dishes. The categories, however, do not seem to be mutually exclusive. There is already ample evidence for the Indianisation of the Mughal fare, in both the ingredients (including cardamoms, cinnamon, saffron, ample fresh ginger root, asafoetida, turmeric and others among the spices; chillis are conspicuously absent, and *summāḳ*, a favourite Persian condiment, appears only once) and the nomenclature (*dāl*, lentils; *sāg*, a spinach dish; *čapātī* among the breads; *khičṙī* among the rice dishes). Abu 'l-Faḍl's list of current market prices for common commodities refers to many by Indian names (e.g. *mūng* and *mōṫh* among the lentils) and includes such Indian favourites as mangoes-in-oil and lemons-in-oil, among the pickles. The large number of meatless dishes calls for comment. Akbar declared a number of *ṣūfiyāna* days in which he ate no meat, including Fridays, Sundays (because, according to Djahāngīr, it was the day of his birth), the first day of each solar month, and throughout the month of Ābān and at least part of Farwārdīn, and on many other days detailed by Abu 'l-Faḍl; he increased the number of *ṣūfiyāna* days each year, and on these days no animals were permitted to be slaughtered. Djahāngīr, whose *Tūzuk* shows him to have been a connoisseur of good food, ate *ṣūfiyāna* meals on Sundays in his father's memory, and on Thursdays to commemorate his own accession.

The kitchen department had also obviously to provide for the wine and other intoxicants used in the court, for although the official chroniclers are understandably reticent on the subject it is inconceivable that similar precautions to those taken for foodstuffs and water should not be applied also to wine. Khʷāndamīr records that a *sūčī khāna* issuing wines existed apart from the *ābdār-khāna*. Besides wine from the grape, *ʿarak*, such drugs as opium, *bhāng* (hemp, *Cannabis sativa*) and the electuary *maʿdjūn*, of variable components, were freely used by many of the Mughal rulers and the nobles (too freely, to judge by the fate of Akbar's sons Murād and Dāniyāl, and many others!).

A subordinate kitchen department, not part of the household, existed to provide

food in the *langar-k̲hāna*, soup-kitchen, established as a charity around many of the royal courts to provide simple food for the poor.

(J. Burton-Page)

Cooking

Ṭabk̲h (A) is the action of cooking either in a pot, by boiling or stewing; or by roasting, broiling, frying or baking. Beyond the narrow sense of cooking only fleshmeat, *ṭabk̲h* meant the transformation from a raw state of every conceivable foodstuff for consumption. Possibly the Arabic substantive for "cook" (*ṭabbāk̲h*) also contained the Hebrew sense of serving food at table, in addition to its preparation. According to some lexicons, cooked food, *ṭabīk̲h*, was distinguished from *ḳadīr*, the latter specifying fleshmeat cooked in a pot seasoned with pepper, cumin and the like, while the former meant meat not thus seasoned; or, *ṭabīk̲h* meant fleshmeat cooked with broth or gravy, while a different term applied to meat prepared without such liquid. It is evident, however, from the extant mediaeval culinary manuals (*kutub al-ṭabīk̲h*) that such distinctions did not obtain in practice, the term "cooked" applying to a dish comprising any combination of ingredients prepared by any of the methods noted above. Here, cooking techniques will be dealt with, together with the main categories of ingredients used.

Cooking techniques varied somewhat according to the social location of the "kitchen". Bread making,an activity common to all segments of the population, llustrates the point well. J.L. Burckhardt observed the following method among the Bedouin of the Arabian peninsula in the early 19th century. First, a circular "element" of stones was heated. The fire was then removed and dough made from coarse-ground grain was set on the stones over which the glowing ashes were placed until the bread was cooked. Unleavened bread made in this fashion was called *k̲hubz malla* or "roasted" bread, *malla* referring to the hot ash and embers. Another method was a kind of grilling process which involved the cooking of large thin loaves on a concave metal plate (*ṣād̲j*) inverted and supported on stones over a fire, with the dough placed on the convex side. Bread was also prepared in the communal oven (*furn)* employed by households among settled hamlet and village as well as the less affluent urban populations; either the dough was prepared in the home and baked in the *furn*, the baker retaining a portion of the dough as payment, or else a poorer quality bread could be purchased directly from the baker. By contrast, bread made for a comfortable urban household was prepared in its own kitchen from the best wheat flour; the appliance used was the *tannūr*, the bee-hive shaped baking oven of Mesopotamian origin. Another general contrast between the urban and rural-nomadic techniques may be found in methods of food preservation. In the latter tradition, sun- and wind-drying of raw materials like meat were common, desiccation being nature's own way of preservation. In the urban kitchen, ingredients such as salt, vinegar, lemon juice, mustard and other spices and the process of smoking were used in addition to the more "natural" means of preservation. Finally, there was a contrast in the use of condiments accompanying a dish and flavourings in food. Complicated preparations like *murrī* and *kawāmik̲h* were commonplace in the urban "high" cuisine, while natural plant flavourings, where they could be had, were employed elsewhere. The cookbooks which have survived reflect the urban milieu of a

leisure class, although they undoubtedly contain as well traces of regional or rural oral cooking traditions. For example, the preparation *sawīḳ* was traditionally made of barley, parched and dried for use on long journeys; the meal was reconstituted with water or milk when required. Food by the same name was sold in the markets of Baghdād as a poor man's staple made from powdered chickpeas. However, in more affluent households this rustic fare was made from fine wheat flour sweetened with sugar or mixed with other ingredients like pomegranate seeds. In the two extant cookbooks of Andalusī-North African provenance, regional tastes appear reflected in the frequent use of eggs in a range of substantial dishes, in the traditional dish of Berber origin, couscous, and in dishes associated with particular locales. The processes and ingredients discussed below are, however, derived solely from the culinary manuals.

The most characteristic cooking method for creating substantial dishes was the "stew" or "casserole" preparation where the ingredients (e.g. meat, vegetables, seasonings) were cooked in liquid in a pot over the heat of a fire. Recipes for meat dishes other than fowl usually use only the word "meat" (*laḥm*) which, appearing unqualified, should be assumed to mean mutton, a meat preference supported by medical opinion. It is impossible to tell at what age the mutton was deemed best for eating, whether as hoggets (between one and two years) or older. Lamb and kid were also enjoyed. Beef is only infrequently mentioned in recipes, possibly mirroring the medical view that, owing to its coarse nature, it was more suited to the toiling and labouring classes. Game meat such as rabbit, hare, wild cow, wild ass, gazelle, horse, mountain goat, oryx and stag were all considered edible. Dishes containing fowl, especially chicken, were also popular. In one recipe for the famous Persian dish *sikbādj*, mutton, beef and chicken are cooked together.

Typically, these are meat dishes with vegetables and seasonings, but also with dried fruit in many cases. The meat in the first stage of the cooking process may be sautéed briskly in hot oil to which water is then added, furthering the cooking, while other ingredients and seasonings are placed in the pot; conversely, the meat may first be boiled in a stock of water and oil to which other ingredients are added while the cooking process is brought slowly to an end. A recipe for *zirbādj* follows the second procedure:

Take a fine quality chicken, joint and clean it and place in a clean pot. Then pour over one-half *raṭl* of fresh water and a half *ūḳiyya* of good quality oil, some white of onion and boil all together. When boiled, pour in white vinegar of half a *raṭl* and two *ūḳiyya* of white sugar and one *ūḳiyya* peeled almonds and one *ūḳiyya* of rose water. Add the spices, pepper, cinnamon and ginger tied up in a fine cloth so that they do not alter the dish's colour. Leave on the fire a little, allowing it to thicken.

This recipe illustrates a number of interesting points about the mediaeval cuisine. First, the dish is also Persian, indicating its strong influence upon the cosmopolitan character of the urban "high cooking culture"; many other dishes, such as *tharīd, maṣliyya and makhīra*, are contributions of traditional Arab provenance. Second, the recipe gives measures of ingredients, a rare feature of the corpus where measures and proportions were left to the cook's discretion. However, characteristic of the recipes is their usually clear, step-by-step description of the process of preparation. Thirdly, *zirbādj* is an example of the common practice of "meat substitution" in dishes; while the main feature

of the dish is its sweet-sour flavour, other recipes for *zirbādj* call for meat (*laḥm*) or a combination of meat and fowl, a practice found today, for example, in North African cooking. Fourthly, recipe references to slaughtering and cleaning an animal or bird indicate that fresh meat could be had from livestock, for example goats and chickens, kept by the household. Finally, a word on the use of spices in cooking. A spice combination in common use throughout the Middle East was cinnamon, coriander (often plus cumin), with pepper and saffron widely employed as well, while regional preferences probably also existed. The essential oils of pepper and cinnamon were known for their antiseptic, preservative properties. Their use was likely as much a matter of aesthetics as anything, their preservative function being useful when left over food could be served the following day, with the flavour of the dish perceptibly enhanced. This "spice spectrum" was inherited from the Middle East and transformed much of the European cuisine from the 14th century onward. The achievement of balance in bouquet and flavour between "aromatic" (e.g. cinnamon) and "pungent" (e.g. coriander) spices was another feature of the cuisine.

Popular meat dishes were also prepared in milk or with milk products; for example, *maṣliyya* was a dish of lamb (or kid) with finely-chopped dried curd cheese (*maṣl*) sprinkled on top, while *makhīra* was meat cooked in soured milk.

Other dishes containing meat were known, however, by a vegetable or fruit highlighted in it. Thus *isfānākhiyya* was a spinach (and meat) dish, *tuffāḥiyya* an apple dish, and *saldjamiyya* a dish of turnip, chicken, onion, cheese and seasonings. In the gardens and orchards of the urban Middle East, vegetables and fruits were seasonally available the year round. In the mediaeval culinary lore, vegetables (*buḳūl*) included edible plants which today would be considered herbs such as mint, dill, fresh coriander and fennel. Fruits (*fawākih*) were classified as dried and fresh; dried fruits included soft fruit like apples and apricots as well as nuts like almonds, pine seeds and pistachios. Fresh fruit, the most common being dates, of which there were said to be more than three hundred varieties, was also used in cooked dishes or else consumed before or after a meal. Plant food classified as "grains" or "seeds" (*ḥubūb*) included chick peas, lentils and the mungo bean (*māsh*) and the grasses wheat, barley and rice.

Vegetables prepared alone without meat formed another broad category of victuals for the table. They could be served hot or cold. One process was to stew the vegetable and then blend into it a quantity of oil into which seasonings had been lightly heated, and finally fold a beaten egg into the mixture while heating it in a pan. Cold dishes were called *bawārid*, and were prepared not only from vegetables, but also from meat, fowl and fish. Frequent ingredients of vegetable *bawārid* were vinegar and a sweetening agent, sugar or honey.

Fish dishes were popular as well. Rather than being stewed, they were generally prepared in a (frying) pan. Fresh fish rather than salted or dried fish appear to be the norm; it was recommended washing the fish thoroughly first, including scaling and gutting, lightly flouring and then frying it. The dish might be simple, prepared for example with pepper, garlic, finely chopped fresh coriander and onion cooked into a kind of sauce which was served over the fish at table. Or else the cleaned fish could be filled and covered with a highly seasoned pasty stuffing and baked slowly in the communal oven.

The cereals wheat, barley and rice were probably common to the tables of the urban leisure class and poor alike.

The difference between them was that the daily bread of poor was made from inferior quality wheat or other cereals while in times of real hardship, "secondary grains" such as pulses and nuts (acorn and chestnut) had to suffice. The well-to-do had access to the finest wheat for even their plainest loaf; the same kitchen could also produce "glass-bread" a loaf baked in a thin glass mould which was broken upon completion of the baking. Wheat flour was also used to prepare many varieties of pastry and sweetmeats.

The culinary manuals include not only preparations for immediate consumption. The preservation of foodstuffs by pickling made mealtime planning more flexible. A preparation called *ḥallām* describes the steps for slaughtering either a kid or calf and boiling the jointed carcass in vinegar until cooked; the meat was then soused overnight in a mixture of vinegar, cinnamon, galingal, thyme, celery, quince, citron, and salt and then stored in glass or earthenware vessels. Again, chicken lightly boiled whole in water, salt and oil was then jointed and the portions placed in jars filled with vinegar and seasonings; when ready for use it was fried in oil and served. Vinegar, which was genuine *vin aigre*, was also the preserving agent for a wide variety of vegetable *mukhallalāt* which included pickled onions, capers, cucumber, turnip, garlic, eggplant and mint. These dishes were offered during meals to "cleanse the palate of greasiness, to appetize, to assist the digestion, and to stimulate the banqueter".

Another variety of relish or condiment was called *kawāmikh*. They may have been served, several at a time, in small bowls into which bread or morsels of food could be dipped. Certain kinds of *kāmakh* or *kāmakh* juice (*māʾ kāmakh*) were added to the pot as seasoning during cooking. One of the most important of this class of condiment was *murrī*, a cereal-based preparation often mistakenly referred to as *garum*, the fish-based condiment of the classical world. It required a long, complicated process which took some three months from the end of March when preparation commenced. The condiment could then be stored for future use; shorter methods lasting only two days were also known which could have been employed the year round.

Activities in the mediaeval kitchen were not merely concerned with the preparation of food for pleasure but also with matters of bodily equipoise. Recipes for main dishes as discussed above often add a brief note as to its benefit for the régime and hygiene. One dish might be recommended to stimulate the appetite and strengthen the stomach, another for cooling the body. A certain class of meatless dish called *muzawwar* was identified for its aid to those with fever. Moreover, other preparations were intended more directly to alleviate the consequences of overindulgence of food, as well as to stimulate other bodily functions and desires; these included such "home remedies" as electuaries, stomachics and medicinal powders and syrups, all prepared in the kitchen for immediate or future use.

Finally, a word on "forbidden" beverages (*sharāb muskir*). Explicit religious injunctions notwithstanding, intoxicating beverages were consumed at every level of society, although never by those who strictly observed the *sharīʿa* code. Recipes are found in the cookbooks for a barley beer called *fuḳḳāʿ* which was simply and cheaply made; fermentation was achieved by placing the barley wort in a skin container and leaving it for two days so that it was ready for drinking on the third. Moreover, wine (*nabīdh*]) was made in fermented and unfermented varieties. Some medical writers noted the medicinal bene-

fits of *sharāb muskir*, although they warned against its possible addictive qualities or even shorter term dangers.

This brief survey of operations in the domestic kitchens of the urban leisure classes has covered the period from about the 3rd/9th to 8th/14th centuries. The major innovation of this "high cooking tradition" was in the collection, transformation, elaboration of and experimentation with hundreds of traditional, local, regional dishes within a dynamic cosmopolitan context. Although the culinary manuals are a rich resource for the study of this aspect of domestic life, they still do not yield answers to all a historian's questions. While the names of two cooks, one male the other female, are known to have held honourable positions in ʿAbbāsid court circles, one would like to know much more about those who performed the myriad operations in this, the most important space of the domestic household, the kitchen.

(D. Waines)

Yoghurt

Yoghurt (T.) from older Turkish *yughur-*, Ottoman *yoghurmaḳ/yoğurmak* "*to* knead" [dough, etc.], yoghourt, a preparation of soured milk made in the pastoralist, more temperate northern tier of the Middle East, Central Asia and the Balkans. It seems to have been used for therapeutic purposes by the pre-Islamic Uyghur Turks.

Partially skimmed milk is reduced over a slow heat, and after cooling, a quantity of a previous fermentation is introduced and then the whole left slowly to cool and become more solid. The product is called *māst* in Persia; *laban* in Syrian and Palestinian Arabic; *zabādī* in Egyptian Arabic; *liban* in ʿIrāḳī Arabic; *rāʾib, laban, labne*, etc. in the Arabian peninsula. A cool, refreshing drink is also made from yoghourt and water (*ayran in* Turkish; *dūgh* in Persian; *lassi* in India). Yoghourt figures extensively in Middle Eastern eating practices, both in cooked dishes and mixed with vegetables such as cucumber (the *māst-khiyār of* Persian cuisine).

(C.E. Bosworth)

Clarified Butter

Al-Samn (Ar.) is butter, made from cows', goats' and ewes' milk, heated over the fire to extract its impurities, and hence called clarified butter (as distinct from *zubd* which is butter made from churned milk). Mediaeval dietetic texts state a preference for clarified butter made from cows' milk over goats' milk. Its medicinal benefits were as an antidote against poisons and snake bites, if ingested alone or mixed with honey, and as an ointment for the cure of boils and abscesses, including haemorrhoids. *Samn* was also used in the kitchen and, according to the anonymous *Kanz al-fawāʾid*, its use (at least in the urban milieu reflected by the culinary manuals) was almost exclusively limited to the preparation of egg dishes, such as omelettes, and sweet dishes made with flour; in the latter case, *samn* was often mixed with sesame oil (*shīradj*).

(J. Ruska, revised by D. Waines)

Ḥays

Ḥays (Ar.; noun of unity, *ḥaysa*) is an Arab dish made from dates (of the variety called *barnī)* crushed and then kneaded with some preserved butter; to this is added skimmed, dried and crumbly camels' milk cheese, or some flour, or even

some crumbled bread. The invention of this mixture of ingredients is attributed traditionnally to a prominent member of Makhzūm called Suwayd al-Haramī, who is also said to have been the first to serve milk as a drink in Mecca.

Judging by some anecdotes and by a frequently-cited verse, it was a much-appreciated foodstuff, especially suitable for travellers, but equally favoured by sedentary peoples. However, this dish was not considered worthy of "being included in the haute cuisine".

Furthermore, the idea of a mixture or mélange contained in the root led to the word *ḥays* being used in a pejorative sense. Indeed, there was a saying *hādhā 'l-amr ḥays* "this is a wretched affair", and a proverb, *ʿāda 'l-ḥays yuḥās* "the *ḥays* has been remixed", that is to say, "it was already bad, but has now become worse", uttered when someone criticises a second person who has performed his task badly, but himself fails to do it any better.

(Ed.)

Sawīḳ

(Ar.) is a food preparation of some antiquity, and one widely known throughout the mediaeval Middle East. Al-Thaʿālibī attributes its first appearance to Alexander the Great, and it is cited in the physicians' works of both eastern and western Islamic lands. It was recommended for travellers and was used to feed armies in the field. For all its fame, it rarely appears described in the extant culinary manuals, although some recipes are found in the earliest (4th/10th century) work by Warrāḳ. Preparation was chiefly from wheat and barley, the former preferred among the urban classes which could afford it. The wheat grain was first washed and then soaked in water overnight. Discarding the water, the wheat was next fried thoroughly until browned. When cooled, it was ground, sieved and then stored for use when it could be eaten by adding sugar. An alternative, more complicated method was to husk and dry the grain before frying. This basic preparation could then be used in other types; for example, in *sawīḳ rummān* three portions of wheat *sawīḳ* to one of pomegranate (*rummān*) seeds were mixed together, cooked, sieved and sugar added. *Sawīḳ* was also added to the dough in making the pastry, *kaʿk*. According to al-Rāzī, pomegranate and apple *sawīḳ* were intended only for medicinal purposes, while wheat and barley types were for nourishment. Plain *sawīḳ* was considered a nourishing substitute for fresh fruit when it was unavailable. Medicinal preparations made from barley are described by physicians who envisaged different ways in which it could be used to achieve different effects within a regimen of health.

(D. Waines)

Sikbādj

(Ar.), a vinegar- and flour-based meat stew or broth cooked with vegetables, fruits, spices and date-juice. It was apparently a popular ʿAbbāsid dish but very likely considered simple folk's food, as borne out by the many anecdotes that make satirical mention of it. Its origins, however, seem to have been royal, namely the Sāsānid court: Ibn Sayyār Warrāḳ (d. second half 4th/10th century) mentions, in his *K. al-Ṭabīkh*, that Khusraw Anūshirwān once asked several cooks to prepare the finest dish they knew and all independently cooked *sikbādj*. This perhaps explains the interest of certain ʿAbbāsid caliphs in the dish.

Sikbādj is an Arabicised word deriving from the Persian *sik*, meaning "vinegar", and *bāhā* (or *bādj)* meaning "type", i.e. of meat. The preparation of *sikbādj* has generated the verb *sakbadja* and prompted the writing of at least two works, both lost, praising its virtues: the *K. Faḍāʾil al-sikbādj* of ʿUbayd Allāh b. Aḥmad b. Abī and that of the great wit, Djaḥẓa.

The proverbs *ilā kam al-sikbādj*! "What! *Sikbādj* again!", and *Yā bārid kam sikbādj*! loosely, "You blockhead! How much more *sikbādj*?", are explained by al-Ṭālaḳānī as proverbs to be used when one has had enough of something. Indeed, it seems from the anecdotal literature that, satirically or otherwise, people either had enough, or could not get enough, of *sikbādj*.

(Shawkat M. Toorawa)

Maḍīra

Maḍīra is the Arabic name of a dish of meat cooked in sour milk, sometimes with fresh milk added, and with spices thrown in to enhance the flavour. This dish, which Abū Hurayra is said to have particularly appreciated, must have been quite well sought-after in mediaeval times. Its principal claim to fame comes from al-Hamadhānī's *al-Maḳāma al-maḍīriyya*, in which ʿĪsā b. Hishām records solely at the beginning of the *maḳāma* an occurrence which he witnessed and then tells the story, it goes without saying, in the mouth of Abu 'l-Fatḥ al-Iskandarī, of an adventure which had happened previously to this last. In effect, this story is the satirical portrait of a nouveau riche who invites Abu 'l-Fatḥ to his house in order to try some *maḍīra*, but goes on at such length about his skill in acquiring the house and other objects, whose praises he sings with such a wealth of details that the invited person, overwhelmed, takes to flight. Pursued by street urchins, he hurls a stone which wounds one of these last grievously, and spends two years in prison. Hence he has vowed never more to eat *maḍīra*, thus explaining why, at the beginning of the *maḳāma*, he refused a dish of it.

(Ed.)

Couscous

Couscous (Ar. *kuskusū*) a word probably of Berber origin meaning couscous, a culinary preparation containing semolina which is the national dish of the peoples of North Africa. It appears with the article and with a final *nūn* in an anecdote depicting an Oriental being advised by the Prophet, in a dream, to treat with *al-kuskusūn* a sick Maghribī; this anecdote is very well known and is probably responsible for leading Moroccan scholars to adopt the form attributed to the Prophet. Couscous was known in Spain, and the word *kuskusū* is provided with the article in the *Kitāb al-Ṭabīkh* published by A. Huici Miranda (Madrid 1965, 181), but this is a case of an arabisation which is not found in vernacular Arabic, where the word never takes the article; *sekso, ksēkso, kuskus, kusksi*, etc., which betrays its non-Arabic origin. The equivalent term among the majority of the Bedouin tribes of Algeria and at Tlemcen is *ṭʿām* used alone, elsewhere it is *ʿaysh, mʿāsh*, or *noʿma*, all of which illustrate the importance of couscous in the minds of the people, especially those in rural areas, who make it the invariable staple of their evening meal.

The quality and the weight of the grains as well as the presentation of the dishes offer a considerable diversity, which is covered by the generic terms cited above but

which is expressed by means of a detailed and extremely varied vocabulary according to regions. We confine ourselves here to a description of the general processes.

Couscous may be prepared at any time, but it is exclusively the work of women: some chose out of preference the nights of Monday and of Friday to take advantage of the *baraka* which is attached to them. The housewife makes an invocation and she must not see or hear anything that might constitute a bad omen; on the contrary, it is the custom to speak in her company only of saints, of the prosperity of the land, etc.

To make her couscous, the woman sits on the ground, places in front of her a wooden plate called *d̲jəfna, gəṣʿa, ḳəṣriyya*, etc. and, to one side, a receptacle containing lightly salted water and a sack of semolina; in some regions, a little flour is also used and to the salted water are added a few drops of *nīsān* water (rain of early May preserved in a flask). The housewife takes a handful of semolina, puts it in the plate, sprinkles it with salted water applied with the hand or with a spoon and proceeds to roll it (verb *ftəl*) with the flat of her hand, until small grains are formed with the size of small buckshot. When the stock of semolina provided is exhausted, the grains are passed through a sieve, and the bigger ones are rolled again until they acquire the desired dimensions or set aside to make a coarse couscous called *mḥammṣa, bərkūks, bərkukes̲h̲, mardūd*, etc. The grains are then cooked in steam and may be kept for some time.

When they are to be eaten, the housewife cooks them for a second time. In a cooking-pot (*ḳədra*), she boils water to which she adds vegetables (chick-peas, turnips, wild teasels, etc.) and/or mutton or beef sometimes browned in a little oil; she puts the couscous grains in a special receptacle (*kəskās*), a conical vessel made of earthenware or plaited alfalfa, the perforated, smaller base of which is placed over the cooking-pot and sealed by means of a twist of straw. Escaping, the steam passes through the holes and cooks the couscous. The housewife takes care that no curds are formed, and when the grain is cooked, she tips it into a bowl, garnishes it with a little butter and covers it with gravy. The vegetables and the meat are most often laid out on the grain. The diners make pellets with their thumb, index and second fingers, and flick them dexterously into their mouths.

In the preparation of couscous with sugar (*səffa, məsfūf*), the cooking-pot contains only water; once cooked, the grains, which are generally finer, are garnished with rather more butter, and the cone which they form in the dish is decorated with ground sugar and cinnamon.

Among the other varieties, we mention *bərbūk̲h̲*, with fine grain, eaten cold, without butter, and moistened with a little milk; *barbūs̲h̲a*, made with barley semolina; this is called *ṣīkūk* in Morocco. The *Kitāb al-Ṭabīk̲h̲* gives the recipe of *fityānī* which is prepared by cooking grain in gravy and which is sprinkled with cinnamon; it also mentions couscous with chicken.

Couscous is quite widely known at the present time, especially in France where it is found commercially produced in food factories and sold "pre-cooked"; conical utensils ("couscoussiers") made of metal are also produced. Restaurants serve several varieties of this Mag̲h̲ribī dish accompanied by a sauce strongly seasoned with pepper (*marga ḥārra; harīsa*).

(A. Cour [Ch. Pellat])

Bread

Bread (Ar. *khubz*) generic term (nomen unitatis: *khubza*) meaning bread, whatever the cereal employed, e.g. corn, barley, rice etc., and whatever the quality, the shape and the method of preparation. There exists nevertheless, in literary Arabic and, to a greater degree in the various dialects, a certain number of metaphors and of specific terms which cannot all be mentioned in this brief article, and the ellipsis of the word *khubz*, in expressions denoting a particular type, causes the semantic range of the fundamental notion to be appreciably enlarged: thus *khamīr* for *khubz* un *khamīr* un "leavened bread", *faṭīr* for *khubz* un *faṭīr* un "unleavened bread" etc. The baker is called *khabbāz* (but in Morocco this is known only in its feminine form *khabbāza*; see below), or *farrān* "oven-worker" (which however in Morocco means a communal oven), and a bakery is called *makhbaz* or simply *furn* "communal oven" (in technical usage corresponding to *kūsha* "lime-kiln" etc.). All these terms apply to precise cases which will be summarised later.

The economy of ancient Arabia was such that the Arabs could not make bread the basis of their diet, so that the expression *ākil al-khubz* "bread-eater" was a laudatory epithet implying considerable affluence. Nevertheless, the nomads occasionally ate a *ṭulma* ("flat bread", for *khubz* u *ṭulmat* in), that is a kind of pancake cooked on a heated stone, or a *malla* ("hot ash", for *khubz* u *mallat* in) also called *malīl*, a thicker loaf cooked under ash according to a process similar to that described in talking of *ḳorṣ*: on arrival at the halting place, the Bedouin kneads flour with water and salt (if he has got it), but without adding yeast, and makes a sort of pie which he cooks in ash, turning it frequently to prevent burning. E. Laoust has collected in Berber (where bread is called *aghrum*) a text which refers to some very similar practices.

For their part, the sedentary people, who were familiar with the whitest flour (*ḥuwwārā*) and bread of the finest quality which they cooked in an oven (*tannūr)*, did not eat it regularly. They used to crumble it, however, to make a broth (*tharīd*) which the Prophet placed above all other foods and it is known that, according to the tradition, Hāshim owes his name to the fact that he crumbled (*hashama*) bread to make broth; this economical dish was highly thought of for a long period after Islam.

The conquest of several nations which produced corn in abundance increased in the various classes of society, and in varying degrees, the consumption of bread, which was from that time considered, with nuances, "the subsistence of the land-dwellers, the basis of nourishment and the prince of foods" and city-dwellers who did not offer it to their guest unstintingly are taken to task. The *Kitāb al-Bukhalāʾ* provides interesting details regarding wheat-bread and its use, but in general it gives a picture of an affluent class, whose members were in a position to own a slave charged with the functions of a waiter or of a majordomo rather than a baker, but called *khabbāz* because of the importance attached to bread.

The same work, while giving valuable information on the refined standard of cuisine then practised, shows that bread was never eaten alone, and that it was incorrect to offer it dry, (*khubz* un *ḳafār* un). In the more affluent circles, it did not constitute the most substantial part of the diet and was rather used for dipping or was eaten from side-plates, while in poorer families and from a very ancient period, it was always accompanied by some condiment (*udm*) designed to make it palatable; in the present day, a term taken from the root *ʿd w*: *ʿadū*, or *dj w z* "to fan": *djwāz,*

jwāz, dwāz, clearly expresses this idea; however, the interested parties probably do not take into account the imbalance which they create in thus adding lipids to the proteins and glucoses contained in bread. It should be stressed however that not everyone was in a position to eat it regularly, and even today, it still constitutes a rare luxury for certain particularly impoverished populations; for the more affluent, the basis of the diet is often, in many regions, boiled rice, ground corn (*burghul*) or kuskus.

Since the classical period and, to a large extent, to the present day, there have existed various categories of bread which can be reduced to the following, while it may be noted that the dialectical vocabulary, extremely variable and rich, deserves to be the object of a linguistic-geographical study, whose ethno-sociological results could yield useful information:

– in Iraq, rice cultivated in the region of Baṣra was used probably by a limited number of bakers (among whom a popular poet, al-Khubzʾaruzzi was to become famous) to make a bread which was quite cheap and accessible to the poorer classes, as well as to those who lived an ascetic life-style; in the other regions where it was cultivated, notably in Palestine and Egypt, rice was more often consumed in other forms;

– white bread, made with pure wheat-flour (*ḥuwwārā*) was in general confined to the more affluent families, but it seems to have been in widespread use in a number of countries, such as Palestine and Egypt; physicians actively recommended it, although it was less nutritious than

– bread of coarse-ground flour (*khushkār* and vars.) which was consumed by people of less means;

– bread made from common wheat, perhaps mixed with a little barley-flour;

– semolina bread (*samīdh/samūd*);

– barley bread, more coarse, mention of which appears frequently in the ḥadīth; ascetics judged it to be sufficient, but many poor families even today, must be content with it; in North Africa, *kesra*, and in the Near-East, *ḳurṣ*, are often nothing more than pancake of barley-flour, pure or mixed with a little wheat-flour;

– to this list it is appropriate to add the bread manufactured, in times of hardship, with flour of maize, millet or sorghum (*dhura*) or even of some wild plant, such as *sameḥ* in Jordan.

Apart from various pastries based on wheat-flour, bread was presented, with variations on which we cannot dwell here, in two principal forms;

– *ruḳāḳ*, very thin, was cooked on a slab of iron (or later, of stone) heated on a hearth or a brazier. This slab, called *ṭābaḳ/ṭābil* in the Middle Ages, is still in use in the Near East where it is convex and bears the name *ṣādj;* in the Maghrib, similar baking is not unknown, but a type of earthenware casserole is more often used, and bread thus prepared is called *marḳūḳ* or *maṭlūʿ*;

– *raghīf*, or (from Persian) *djardaḳ/djardhaḳ* is a round bread (*muḥawwar*) quite thick and cooked in an oven. But there is a distinction there between the domestic and the communal oven. The former (*tannūr*; currently *ṭābūn/ṭābūna*) has the form of an upturned jar without a base or of the frustrum of a cone open in the upper part; it is heated by means of embers placed inside and the raw dough is spread on the sides, on the outside. In certain regions there is also still to be found a *tannūr* dug into the earth, while in Jordan *ṭābūn* refers to a small construction in which is placed a sort of cooking-pot, surrounded by embers to cook the dough in the interior. In encampments the oven is replaced-by a pottery plate (*ghannāy* or *ḥammāṣ* in Tunisia) which is heated on a brazier (*kānūn*) or even, on occasion, by heated stones.

As for the communal oven (*furn, kūsha*) it is found in various parts of the towns as well as in the villages, and it is there that individuals normally cook their bread for consumption at home. Until recently, in the Maghrib at least, it was considered dishonourable to buy one's bread outside, and the kneading of the dough, an essentially feminine occupation, was the duty of the mistress of the house or of a servant. On a large wooden tray (*ḳaṣʿa/gaṣʿa*), the housewife put, sometimes with a little bran, flour of corn or of barley or of both, or even of semolina, in quantities sufficient to provide food for several days, added yeast and salt, then poured in hot water and kneaded the dough which she then cut into pieces and left to rise on a tray in a warm place. A journeyman baker (*ṭarrāḥ* in Morocco) went round the houses, took the trays, imprinted on each piece a distinctive mark and took it all to the bakehouse.

The baking done, the baker came and handed over to each family the tray and the bread belonging to it. The wages of the baker consisted of a piece of bread which he baked and sold to his profit; in al-Andalus, this bread was called *ṗoya* (and vars.) and this term has survived under the form *pūwa/pūya/būya*, in some regions of Morocco and of Algeria to designate the salary of the baker, even after it became the practice to pay him in cash.

Thus there were no real bakeries, and there was no *sūḳ* reserved for the making and the sale of bread. However, foreigners, individuals and bachelors were able to obtain it, either from certain women who kneaded extra pastry in order to sell the surplus bread in the streets, at a price fixed by the *muḥtasib*, or from bakers or retailers; in fact the *farrān* sold not only the small amounts of bread that they had received in wages (for they were in principle forbidden to mix the pieces of dough to make large loaves, but also the bread which they made on their own account. The authors of works of *ḥisba* especially al-Saḳaṭī, enumerated in detail the frauds committed by these bakers, in such matters as the mixing of flours of different qualities (and even the addition of white earth), as well as malpractices in the baking and in the weighing of the bread, and also the rules of hygiene which were to be observed by the bakers and the traders who, in particular, were not allowed to work at professions such as those of the butcher or the fishmonger. In spite of these precautions, the quality was not always high, and bread sometimes contained gravel and other impurities.

The price of bread, sold by weight and not by the loaf, was fixed by the *muḥtasib*, but it varied enormously, and it is the price of corn which provides the most convenient basis for estimating the cost of living.

As in other civilisations, bread is treated with great respect. It is always broken and it should never be cut with a knife. A crumb which falls to the ground is picked up, raised to the lips and swallowed; a piece of bread found on the road is put, for the benefit of some destitute person, in a place where it will not be trodden on and soiled. And even though it does not constitute, strictly speaking, the basis of the diet, it is given in the Arabic dialects names which refer to life and to subsistence; *ʿaysh/ʿīsh*, *maʿīsha*, *kūt*, etc. And it is not absolutely certain that the magical purposes that it served have totally disappeared.

However, the situation described above has now been perceptively modified in the sense that, in the towns at least, it is from the bakeries that the population buys the bread that it needs; but if the making of bread has borrowed from the West certain modern processes, anyone can still

easily obtain *khubz ʿarabī* prepared and presented as in ancient times. Also, in the countryside the tradition is still alive.

(Ch. Pellat)

3. Spices, Seasonings, and other Ingredients

Spices

Afāwīh (Ar. pl. of *afwāh*, sing. *fūh*) are aromatic substances, which are added to food and beverages in order to increase pleasant flavour and promote digestion. In general they are vegetable products which are active through their contents of volatile oils or pungent substances. The classification according to the individual constituents of plants (fruits and seeds, blossoms and buds, peel, roots, etc.), in use at present, does not seem to have been in practice realised anywhere. It is possible that Abū Ḥanīfa al-Dīnawarī (end 3rd/9th century) has this in mind when he says that *al-afwāh* fall under various classes and types (*aṣnāf wa-anwāʿ*), and then quotes a verse each of Dhu 'l-Rumma and of Djamīl [al-ʿUdhrī], according to which there is a distinction between *afwāh al-nawr* and *afwāh al-buḳūl*. An unsystematic list of food spices, among which are included the most common like salt (*milḥ*), is to be found in Ibn Ḳutayba under the heading *maṣāliḥ al-ṭaʿām*, where *maṣāliḥ* must have the plain meaning of "spices, food-flavourings". In Arabic the meaning of *afāwīh* is not sharply marked off from *ʿiṭr, ṭīb* "scents", and *ʿaḳḳār* (plur. *ʿaḳāḳīr, ʿuḳḳār*), "drugs". The lexicographers call *al-afwāh* what is added to scents, and *al-tawābil* what is added to food.

Specific monographs on *al-afāwīh* do not seem to be known. These substances are treated in their appropriate places in works on botany, pharmacognostics, medicine, knowledge of commodities, encyclopaedias and other writings. A list which is, to a certain extent, representative for the 4th/10th century, is to be found in al-Masʿūdī, *Murūdj*, containing 25 main kinds of spices: 1. *sunbul* spikenard, 2. *ḳaranful* clove, 3. *ṣandal* sandalwood, 4. *djawzbuwwā* nutmeg, 5. *ward* rose, 6. *salīkha* cassia, 7. *zarnab* (meaning doubtful), 8. *ḳirfa,* cinnamon, 9. *ḳarnuwa* (a kind of sonchus?), 10. *ḳāḳulla* cardamom, 11. *kubāba* cubeb, 12. *hālbuwwā* small cardamom, 13. *manshim* carpobalsam, 14. *fāghīra* xanthoxylum, 15. *maḥlab* morello, 15. *wars* Flemmingia rhodocarpa, 17. *ḳusṭ* costus, 18. *azfār* (*al-ṭīb*), Strombus lentiginosus, 19. *birank* Embelia Ribes, 20. *ḍarw* lentisk gum, 21. *lādhan* ladanum, 22. *mayʿa* aromatic gum of the storax tree, 23. *ḳanbīl* Mallotus philippinensis, 24. *ḳaṣab al-dharīra* calamus, 25. *zabāda* civet.— Notable is the fact that one of the oldest and most utilised spices, pepper (*fulful*), with its *ca.* 700 different kinds, does not appear in this inventory.

In the section on knowledge of commodities in his handbook on mercantile science, Shaykh Abu 'l-Faḍl Djaʿfar al-Dimashḳī (probably 6th/12th century) enumerates, under the term *saḳaṭ* (plur. *asḳāṭ,* strictly speaking "refuse"), a list of spices which is quite different from that of al-Masʿūdī: under the "small spices" (*al-saḳaṭ al-ṣaghīr*) he mentions only the rhubarb (*rāwand*) and leaves the others out as being less important, but under the "great spices" (*al-saḳaṭ al-kabīr*) he reckons: 1. *nīl* indigo, 2. *baḳḳam* sapanwood, 3. *fulful* pepper, 4. *lubān* frankincense, 5. *maṣṭakā* gum mastic, 6. *dārṣīnī al-ṭaʿām* food-cinnamon, 7. *āl* yellow ginger, 8. *zandjabīl* ginger, 9. *zurunbād* redowary-root, 10. *khūlandjān* galingale, 11. *ḳusṭ* costus, 12. *lādhan* ladanum, 13. *ihlīladjāt*, kinds of myrobalan.

Scattered or unsystematically-arranged material for the knowledge of spices is

to be found, as can be expected, in the encyclopaedias of the Arabic and Persian literature. Preliminary statements already appear in al-Kh^{w}ārazmī's *Mafātīḥ al-ʿulūm* under medicaments, while ample material is given by Nuwayrī, *Nihāyat al-arab*, the entire twelfth volume of which is devoted to this subject; scents (*ṭīb*), perfumery (*bakhūrāt*), many kinds of Galia moscata (*ghawālī*), perfumes made of aloe with various admixtures (*nudūd*), distillates (*mustaḳṭarāt)*, oils (*adhān*) and certain perfumes (*naḍūḥāt*). Among these rubrics we find also descriptions of some of the spices already mentioned, such as sandalwood, spikenard, cloves, costus, etc. All this is mixed up with detailed statements about other materials which can be counted among spices only with reservations or in no way at all. As in mediaeval Europe, ground spices were often adulterated, especially in times of distress. Here we only recall the original work of Djawbarī (*ca.* 615/1218), *Kitāb al-Mukhtār fī kashf al-asrār wa-hatk al-astār*, which allegedly informs traders about deceitful devices in commerce and trade; it was printed several times in the Orient and deserves a critical edition.

Since there is hardly any spice which was not at the same time used as medicament, it is no wonder that the most comprehensive material on spices is to be found in the pharmacopoeias. These are essentially based on the *Materia medica* (ὕλη ἰατρική) of Dioscorides. This work, translated into Arabic at an early period, lived on in the Islamic world in ever-new compilations, expanded by a great number of drugs which the Arabs had come to know in the course of their conquests. The material is to be found on the one hand in pharmacognostic and pharmaceutical monographs, the development of which came to a certain conclusion with Ibn al-Bayṭār's great compilation, and on the other hand in the pharmaceutical sections of compendia on general medicine. It should, however, be remembered that in these works spices are entered and described as medicines in the first place, not as condiments.

Together with cambric textiles, spices were considered as the most fashionable luxury; both products are often mentioned together as the most lucrative ones. In Egypt, where for a long time corn had offered the best chances for investment, spices and drugs took its place after the Crusades. In the later Middle Ages, the spice trade, and the pepper trade in particular, was mainly in the hands of Egyptians and Venetians. A good survey on the spice trade under the Ayyūbids and Mamlūks is to be found in G. Wiet, *Les marchands d'épices sous les sultans mamlouks*, in *Cahiers d'histoire égyptienne*, série vii (1955), with a rich bibliography. However, the author does not deal with particular spices, but with their general trade. Under the protection of the sultans this trade was carried out by important bodies of merchants, who forwarded the spices from India and South-East Asia to Europe by way of Egypt through the Red Sea or by way of Syria through the Persian Gulf. About these trading companies and their monopoly we have some detailed information, especially about the wealthy Kārimī, who controlled the spice trade between the Yemen and Egypt. The "spice-wars" with the European ports in the Mediterranean, started by the Ayyūbids and continued by the Mamlūks and the Ottoman Turks, were waged on both sides with great ruthlessness. Internal policy was carried out, just as rigorously, especially by the Mamlūks: in 832/1429 Barsbāy founded a state monopoly of pepper and three years later he forced the wholesale merchants to buy from him for 80 *dīnārs* a *ḥiml* the pepper which they had sold to him earlier for 50 *dīnārs*. Even so, Ḳānṣawh al-Ghawrī not only maintained

this monopoly system, but imposed additional heavy taxes on the merchants. Hopes of cutting out Egyptian middlemen were the decisive inducement for the Spanish and the Portuguese to search for a direct sea-route to India; but after the conquest of the Moluccas in 1607, the Dutch snatched the monopoly of the spice trade away from the Portuguese.

(A. DIETRICH)

Salt

1. IN THE MEDIAEVAL ISLAMIC WORLD

In pre-Islamic times, the ancient Arabs were already familiar with salt and used it, not only for seasoning their food but also in certain rites, e.g. for the oath which cemented an alliance, made around a fire. But it appears that certain tribes were not able, or did not want, to utilise salt for these rites, Now following their custom, even when the salt used symbolically to seal this alliance was substituted by milk, the latter substance continued to bear the name of *milḥ*.

The two types of salt known in the Islamic world were sea salt (*milḥ baḥrī*) and rock salt (*milḥ barrī*, lit. "earth salt"). Certain salt mines were well-known: e.g. in Africa, Awlīl was called "the salt town". In the Persian province of Fārs, salt was produced; thus it was extracted from the fringes of the Djankan lake. Mountains of salt which remained unexploited are mentioned in the sources, near the Dead Sea, whilst near Dārābdjird in Persia, the "salt mountain" was situated; its deposits contained salt (probably in a sense wider than that of table salt, see below) in a very solid form, from which various objects were carved, e.g. trays, platters, etc., which were exported to other countries. Speaking of these deposits, Yāḳūt explains that, in all the mines of other countries, fairly deep mining was necessary to reach and extract the salt; the author thus reveals to us a very important factor regarding the exploitation of rock salt. Salt was also obtained from certain salt marshes (*sibāk<u>h</u>*, sing. *sabk<u>h</u>a*) near Baṣra, where a great number of slaves were employed in the production of salt. Near Alexandria, on the sea coasts, according to a 17th century traveller, "holes and channels were made into which the sea water ran, and then the sun's heat evaporated this water and in the end turned it into salt", whilst another traveller in the same century describes how quantities of salt were derived from the Nile's bed (probably in the Delta; the exact region is not pinpointed), for "when the Nile recedes, one finds salt on the surface of the ground like a white covering". He adds that Egyptian salt is the best in the world and is cheap. In 1320 the Egyptian authorities levied a tax on the sale of salt. Despite its low price, it is related that a certain person gave a box full of salt to someone as a present, but it appears that the originality of the idea was much more important than the present itself and indicates that it was an isolated case.

As in other languages, the word denoting salt contains several senses in Arabic: not only that of table salt (sodium chloride), but also several kinds of natron and other substances resembling salt. There is found tanners' salt (*milḥ al-dabbāg<u>h</u>a*), naphtha salt, goldsmiths' salt (*milḥ al-ṣāg<u>h</u>a*), etc. The medical qualities of salt, with or without garlic, etc., are well-known in medical literature and in *ḥadīt<u>h</u>*. It is called "the king of spices"; it was added to several items of food and used to preserve the freshness of fish and other products, and mixtures of salt and spices were prepared called *milḥ muṭayyab* (lit. "perfumed salt").

(J. SADAN)

2. In medicine

Knowledge of the manifold healing powers of salt, already praised by Dioscurides, was taken over by the Arabs and enlarged by their own observations. Together with common salt, rock-salt (ἅλες ὀρυκτόν), to which probably corresponded Ar. *milḥ andarānī*, was considered to be the most valuable. Distinction was also made between salt smelling of naptha (*al-naftī*) and of boiled eggs (*al-bayḍī*), the black Indian salt, uric salt (*milḥ al-bawl*), potassium salt (*al-ḳily*), and others. All salts have astringent power, while many are effective as emetics and laxatives, dissolve viscous phlegm and purge the bowels. Salt stimulates the appetite and aids the digestion, but excessive use heats the blood, weakens the power of vision, diminishes potency and causes itching and scabies. Bitter salt (*al-milḥ al-murr*) purges black bile, Indian salt the gastric juices. Wool saturated in a salt solution, if put on a fresh wound, stops the bleeding. According to the *K. al-Tad̲jribatayn ʿalā adwiyat Ibn Wāfid* of Avempace (Ibn Bād̲jd̲ja), the manuscript of which has been lost but which is quoted at length by Ibn al-Bayṭār, salt also plays an important rôle in dentistry: dissolved in vinegar and used as mouthwash, it stops the bleeding of the gums and of open wounds after an extraction; the same solution, if heated, soothes teeth and, used as gargle, removes phlegm from the mouth.

(A. Dietrich)

Cinnamon

The Arabic *dār ṣīnī*, or *dārṣīnī* (Persian *dār čīnī* "Chinese wood"), is the Chinese cinnamon (*Cinnamomum cassia*), next to the Ceylonese cinnamon (*Cinn. zeylanicum*) the most valuable spice from plants of the cinnamon species, of the family of the Lauraceae, perhaps the oldest spice altogether. The rind of the branch of the cinnamon-tree was used in China as medicine, aromatic substance and spice already in the 3rd millennium B.C., and reached the Near East and the Mediterranean countries in the 2nd millennium. It cannot be established with certainty with what original plant *dārṣīnī* is to be associated, since in the pharmacognostic texts *Cinn. cassia* is also rendered by *salīk̲ha*, which allegedly is not identical with *dārṣīnī*. The Greeks (Dioscorides) called the class κιν(ν)άμωμον, and the rind of the Chinese κασσία; the Arabs speak accordingly of *ḳinnāmūmun* (and variants) and *ḳāsiyā* (*ḳassiyā*); in Spanish-Arabic texts it even appears in the Romance form *d̲jinnamū* (*cinamomo*). Since Ceylonese cinnamon was exported rather late from the island, hardly before the 14th century A.D., *dārṣīnī* , according to its name, can only indicate Chinese cinnamon during the whole previous period.

The older Arab botanists did not know what to do with the term *ṣīnī* and associated it with an unidentified drug *ṣīnīn* mentioned by al-Aʿsh̲ā. Isḥāḳ b. Sulaymān al-Isrāʾīlī (d. *ca.* 320/932) was perhaps the first to perceive that cinnamon came indeed from China. Like the numerous other Asiatic spices, cinnamon was imported mainly by the sea route, the most important transit-port being ʿAdan.

The Arabs knew a whole range of kinds of *dārṣīnī* which cannot be determined more closely: the "real Chinese cinnamon" (*dārṣīnī al-Ṣīn*), an inferior kind (*dār ṣūṣ*), the "real cinnamon rind" (*al-ḳirfa ʿalā ʾl-ḥaḳīḳa*), the "clove-rind" (*ḳirfat al-ḳurunful*), the "pungent cinnamon" (*al-ḥādd al-maḏh̲āḳ*), etc. As spice for food, there served not only the tubular rind of the cinnamon-tree, but also its leaves, blossoms and unripe berries. The

pleasant scent is caused by the volatile oil extracted from the rind. Taken as a medicine, cinnamon reduces and softens thick substances, strengthens the stomach, liver and spleen and counteracts their sluggishness, quickens the activity of the heart, invigorates the eyesight and is effective against poisonous bites and stings of scorpions. Spread on excrement and urine, it does away with their nasty smell.

(A. DIETRICH)

Sandalwood

Ṣandal (A., P. *čandal* from Skr. *čandana*) is the sandal wood, coming from several unrelated trees which are mainly of Indian and Southeast Asian origin.

Both white and yellow sandalwood were, in fact, only different kinds of *Santalum album L., Santalaceae*. It supplies the bright, white sap-wood and the reddish heartwood. Because of its peculiar scent, probably experienced as very pleasant, it was appreciated from time immemorial and used, among other purposes, for perfumeries, and its ethereal oils against inflammations of the urinary passages. The red sandalwood, on the other hand, is the heartwood of *Pterocarpus santalinus L., Leguminosae*. It is totally scentless and of little value, but was popular for its beauty. It is not known how the name *ṣandal* was transferred from the white-yellow to the red wood. The Arabic authors know the same threefold distinction. Sandalwood was unknown to the Greeks. The yellow, fat (*al-dasim*), heavy wood, which looks as if it were painted over with saffron and is therefore also called *al-zaʿfarānī*, is accounted the best sandalwood. It has a strong fragrance and is designated as *al-maḳāṣīrī* (the meaning of this *nisba* is not clear). Of the white sandalwood, which is also fragrant, there exist various varieties, which incline partly to yellow, brown and red.

The use of various sandalwoods in medicine, above all of their ethereal oils, is described extensively from several sources by Ibn al-Bayṭār. When added to electuaries (*maʿd̲j̲ūnāt*), they are *inter alia* effective against fever and heating of the bile. If inhaled, its powder is effective against pleurisy (*birsām*) and congestion (*? lahīb*). If the electuary is applied together with rosewater as a poultice, it is effective against erysipelas (*ḥumra*), boils of feverish gout (*al-niḳris al-ḥārr*) and infections of the eyelids (*s̲h̲atar*).

In the Magh̲rib *ṣandal* indicates thyme (*nammām*) and the wild and cultivated mint (*Thymus serpyllum L., Labiatae*).

(A. DIETRICH)

Dill

S̲h̲ibit̲h̲th (Ar., in popular parlance *s̲h̲ibitt, s̲h̲abat̲h̲*) is dill (*Anethum graveolens L., Umbelliferae*).

Like Akkadian *ʾibittu*, the name goes back to Aramaic *ʾəb̲ittā*. The Greek name ἄνηθον (*anīt̲h̲ūn*), which lives on in Mozarabic *anīṭū*, was taken from the *Materia medica* of Dioscurides; the Berber synonym *aslīlī* circulated also. When blossoming, dill resembles the fennel (*basbās, Foeniculum vulgare, L.*); like the latter, dill is an ancient plant and is used in kitchen and medicine in the same way as the fennel. The main areas of origin of the cultivated dill are middle and southeastern Europe; wild dill is found in the Mediterranean area and in the Near East. Roots, seed and herb of the dill contain an aromatic, ethereal oil. From old times, the young sprouts have been used as spices for cucumbers and salads.

The main significance of dill, however, was already in ancient Egyptian times in the field of medicine. It was used as a stomachic, carminative, diuretic and vermifuge drug. Its peculiarity consists in the fact that it dispels colic originating from flatulence, heavy gases, and mucus coming from stomach and intestines; it also puts one to sleep. Its seeds, pulverised and cooked in water, cause heavy vomiting and purify the stomach from dyscratic juice (*ruṭūbāt*). A hip bath in an extract from dill is good for pains of the womb. Applied as a poultice, dill divides the swellings originating from flatulence. Its ashes are good for soft (*mutarahhil*), heavily festering ulcers, and its decoction for pains of kidneys and bladder, caused by constipations or flatulence. Pulverised and boiled with honey until concentration, and then applied on the backside, dill has a strongly laxative effect. Taken in soup or broth, its seeds strengthen the flowing of milk. The freshly blossoming dill in particular is good for colic, haemorrhoids and sticky vomit from the stomach.

(A. Dietrich)

Fennel

Fennel (*Foeniculum vulgare*, Ar. *Basbās*), belongs to the family of umbellal plants. The term *bisbās*, used in the Maghrib for fennel, indicates in the Eastern countries the red seed-shell of the nutmeg (*Myristica fragrans*), known as Macis, while the term *basbāsa*, not to be confused with the two other terms, indicates only nutmeg in the entire Arab world. The most often used synonym of *basbās* is *rāziyānadj*, borrowed from the Persian. The Greek term μάραθ(ρ)ον is found as *māraṯhūn* (and variants) in the Arabic medical inventories. Like in Dioscorides, this term indicates the garden fennel (*basbās bustānī*), *Anethum foeniculum*, while ἱππομάραθον (*ibbūmāraṯhūn*, and variants, strictly speaking "horse fennel"), which is mostly mentioned in connection with the garden fennel, apparently stands for the wild fennel. The term *basbās djabalī*, likewise used for the latter, is confusing, for the "mountain fennel" (Seseli) does not belong to the genus Foeniculum. Other kinds mentioned cannot as yet be determined.

The volatile oil extracted from the fruits of the fennel has a strongly fragrant scent and a bitter, camphor-like smell. It loosens phlegm and was, in the form of fennel-tea or fennel-honey, used, as it is now, against coughs and flatulence. A decoction of the flower stalk was considered to be a diuretic and to further menstruation; mixed with wine it was used as a medicament against snake bites, while the pressed juice is praised as an ophthalmic remedy. The leaves and fruits were added to food as a spice. Aṣmaʿī counts them among the precious spices. Abū Ḥanīfa al-Dīnawarī praises their aroma, remarks that the plant thrives on wild soil and proves both observations with verses. Fennel has been used as spice from Old Egyptian times until today. Ibn al-ʿAwwām consecrates a special chapter to the cultivation of the fennel. Curious is the assertion of Nuwayrī, that vipers and snakes, when leaving their holes in spring, rub their eyes at the fennel shrub in order to be able to see again; the same is mentioned repeatedly by Ḳazwīnī.

(A. Dietrich)

Mint

Fūdhandj (*fawdandj*, *fawtandj*, etc.) is *Mentha* L. (Labiatae). The term is of Persian, and ultimately of Indian origin (*pūdana*), which explains the various ways of transcription in the Arabic rendering. Under

the name *ḥabaḳ* mint was well-known to the Arab botanists. They describe it as a fragrant plant with an acrid taste, square-sectioned stalk and leaves similar to those of the willow. It often grows near water and resembles the water-mint, called *nammām*. The Beduins considered it as a means to check in both man and animal the longing for coitus.

The Arabic nomenclature of the mint is abundant, as was already the Greek one, but it is rather confused, and so the identification of the individual kinds is made considerably difficult. Ibn Djuldjul of Cordoba equates the καλαμίνθη of Dioscorides, which appears as *ḳālāminthī* (and variants) in Stephanos-Ḥunayn, with *fūdhanǧ* (see Anonymous, Nuruosmaniye 3589, fol. 99a–b) and knows the following three kinds of it: (a) *fūdhanǧ nahrī*, the "river-mint", also called *ḍawmarān*, apparently *Mentha aquatica* L.; (b) *fūdhanǧ ǧabalī*, the "mountain-mint", also called *nābuṭa* (< Latin *nepeta*).

This simple basic pattern was completed and differentiated by later pharmacologists. For the river-mint there appear the Arabic terms *nammām, ḥabaḳ al-mā'* and *ḥabaḳ nahrī*, in Egypt *ḥabaḳ al-timsāḥ*, in Andalusia the Mozarabic *mantarāshtaruh* (*mastranto*, etc.); the last term indicates in fact another kind, namely *Mentha rotundifolia* L. In the literature of translations the river-mint probably corresponds with σισύμβριον = *sisinbaryūn* (and variants). The mountain-mint is later mostly equated with the "rocky" (*al-ṣakhrī*) and with the wild mint. In Mozarabic the wild mint is called *bulāyuh, fulāyuh* (*poleo* < Latin *pulegium*, German *Polei*), and also *ghubayrā'* or *ʿirmiḍ*. To this should be added above all the "cultivated mint" (*fūdhanǧ bustānī*), that is, the pepper-mint, *Mentha piperita*, the ἡδύοσμον *īdiyāsmun* of the literature of translation, well-known and favoured as *naʿnaʿ* or *nuʿnuʿ*. Other kinds are also mentioned, which can be omitted here; they are not at all to be connected with the genus mint (like *fayṭal*), or only with some restriction (like *ṣufayrā'*).

As still today, mint had a many-sided medicinal effect, above all from the menthol contained in the volatile oil of the leaves of the peppermint. For the preparation of fragrant peppermint tea, Ibn Waḥshiyya recommends a method which is based upon all kinds of superstitious notions. The juice of the river-mint, taken with honey, has a strong heating and sweat-producing effect; taken with water, it helps against shooting pains and sciatica, promotes menstruation, drives off the tape-worm and is useful against jaundice since it opens up the sluggishness of the liver. Mountain-mint dilutes thick and stickly fluids which accumulate in the breast or lungs, and secretes them. Peppermint, taken with vinegar, does away with nausea and vomiting and checks haemorrhages. On the specific effect of menthol is based its use, common until now, for diarrhoea, gripes, flatulence and, above all, catarrh of the respiratory tubes.

(A. Dietrich)

Myrtle

Ās is Arabic for the *Myrtus communis* L. (Myrtaceae), the well-known fragrant, evergreen shrub, growing to over a man's height. The term, derived from Akkadian *āsu* came into Arabic through Aramaic *āsā*; the Greek term μυρσίνη (μύρτος) exists also as *marsīnī* (and variants). Occasionally, myrtle is mentioned in the *ḥadīth*, by the Arab botanists and in the verses quoted by them, but the plant was mainly used as medicine. Like Dioscorides, the Arabs knew the black garden-myrtle (*al-ās al-bustānī al-aswad*) and the white field-

myrtle (*al-ās al-barrī al-abyaḍ*), the leaves, blossoms and berries of which occasioned positive therapeutic results. The scent of the myrtle mitigates headaches and invigorates the heart. The extract is suitable for hipbaths which cure ulcers of the fundament and uterus; as a beverage it calms down the spitting of blood and cures coughs and diarrhoea. Dried and pulverished leaves of the myrtle remove putrescent boils and facilitate the growing of new flesh. Rāzī, otherwise critical and not given to superstition, curiously enough declares in his *Kitāb al-Ḫawāṣṣ* (preserved in Latin; of the Arabic text, only quotations are known) that a man, suffering from a boil in the inguinal region, may find mitigation by putting the stalk of a myrtle around his finger by way of a ring. The manifold symbolical meaning attributed to the myrtle on festive occasions by the Israelites, Greeks and Romans seems to have remained unknown to Islam; according to an Arab legend, it was brought from Paradise by Adam.

(A. Dietrich)

Camomile

Bābūnaǧ (*Babūnak*), from Persian *bābūna*, is the common camomile, primarily *Anthemis nobilis* L. (Compositae), also called Roman camomile, but also *Matricaria chamomilla* L. (Comp.) and other varieties. The nomenclature is rather confused; it can indeed hardly be expected that the various kinds of the camomile were kept apart with precision. The term is derived from χαμαίμηλον ("apple of the earth") and was known to the Arabs partly in a transcribed form (*ḫamāmālūn*, and variants), partly as borrowed translation (*tuffāḥ al-arḍ*). The relatively clearest determination is perhaps offered by an anonymous pharmacobotanist of Spanish-Arabic origin (very probably Abū ʿAbbās al-Nabātī b. al-Rūmiyya, 561–637/1166–1240): "There are three kinds of *al-bābūnaǧ*, the stalks, leaves and general form of which are similar to each other. The distinction between them is to be found in the colour of the blossom-leaves which enclose the yellow, situated in the middle of the blossoms, for the blossoms of these three kinds are yellow in the middle. In the white kind they are enclosed by small leaves which are white inside and outside, in the purple-coloured kind by small leaves which are blue inside and outside, and in the yellow kind by small leaves which are yellow inside and outside. The distinction between the white and the chrysanthemum (*al-uḳḥuwān*) lies in the scent, for the chrysanthemum assumes [extraneous] scents, and all these kinds have a pleasant scent". In general, *bābūnaǧ* corresponds to the ἀνθεμίς of Dioscorides, and appears therefore also transcribed as *anthāmis* (and variants). *Uḳḥuwān* just mentioned, which is uncommonly often equated with *bābūnaǧ*, is otherwise used by the Arabs to render the παρθένιον (*barthāniyūn*, and variants) of Dioscorides, by which we should probably understand the medical *Matricaria chamomilla*, still in use today. Ibn al-Bayṭār, on the other hand, says that the "white" kind of camomile described by Dioscorides and called *uḳḥuwān* by the Arabs, has been replaced by *bābūnaǧ*. The blossoms of the camomile, which contain an oil that checks inflammations, were used as a medicine for loosening spasms and for stimulating easily the peristaltic motion; infusions made from the blossoms ("camomile tea") were utilised externally for baths, compresses and rinses at inflammations of skin and mucous membranes, in both antiquity and in Islam in a manner similar to present practice.

(A. Dietrich)

Rose Water

In Arabic *māʾ al-ward*, sometimes also found in the single word form *al-māward*, which suggests that among doctors and apothecaries, this commodity was perceived as something very specific), an essential preparation in Arab pharmacology.

Use of rose water is to be seen in the context of the knowledge professed by the Arabs of the medicinal and cosmetic properties of the rose and, clearly, their mastery of the technique of distillation. While the treatises evoke numerous varieties of rose, the generic term for which is *ward* (a word originally denoting, in classical Arabic, any flower of shrub or of tree) or indeed the Persian *gul*, they are not immune from ambiguity. Thus the red rose is sometimes called *ward aḥmar*, sometimes *ḫawḏjam*, a term reserved by some for the damask rose. The varieties most frequently attested are three in number, if the wild rose is excluded (*nasrīn: Rosa canina*); white rose (*Rosa alba: ward abyaḍ, waṯẖīr*); five-leaf rose (*Rosa centifolia: ḫawḏjam*); damask rose (*Rosa damascena: ward ḏjūrī, ward gūrī, ward baladī, ward šẖāmī*). Rose water was extracted from the petals of the last-named, pale red in colour and flowering from the spring to the end of summer. It may be noted that the rose was among the ingredients of various other concoctions such as rose honey (*ḏjulanḏjubīn*) or julep (*ḏjulāb*).

Rose water was thus obtained by the distillation of the damask rose (*ward ḏjūrī*, the *nisba* referring to the town of Djūr in the south-west of Persia, a technique described in detail by al-Nuwayrī, with reference to several recipes, on the basis of his usual source, namely the *Kitāb al-ʿArūs* of al-Tamīmī. But, contrary to what might be supposed, the majority of recipes for rose water blended this flower with other medicinal herbs such as aloes, saffron, musk, camphor or even cloves. This essence could be obtained from the petals (*waraḳ*) of the fresh flower (*ward ṭarī*) or of the dried flower (*ward yābis*), when they had been ground and set to macerate in the cucurbit (*ḳarʿa*, i.e. lower part of the alembic; then, by means of the alembic (*al-anbīḳ*, here the coil) and its heating, the rose water was collected by distillation (*taḳṭīr*). The procedure of sublimation (rudimentary distillation, *taṣʿīd*) was also in use, according to al-Nuwayrī.

As regards the medicinal properties, the sources attest that distilled rose water was used, internally or externally, in the treatment of migraine, nausea and anxiety, but, especially, in eye-washes, to combat ophthalmia. Mediaeval treatises on pharmacology and of ophthalmic medicine lay particular stress on the salutary properties of rose water as a wash for the treatment of numerous conditions of the eye, as well as for their prevention. The emollient and stabilising properties of rose water, often combined, in this case, with egg white, were appreciated after operations for cataract. Use of this essence as an eye-wash is still common today and traditionally-inclined doctors readily prescribe it. Besides the purely medical use of this commodity, a number of texts refer to its benefits in the sphere of cosmetics and aesthetics, especially as a deodorant and as a cooling agent.

(F. Sanagustin)

Musk

Arabic *misk* is the gland secretion of the male musk deer (*Moschus moschiferus* L., *Cervidae*), discharged from the musk pouch, the prepucial bag-like formation near the navel of small deer resembling roes or gazelles. According to a tradition,

"musk is the best and strongest smelling perfume". In antiquity, musk was not known. In Byzantium, it turns up in the 6th century.

Al-Masʿūdī also quoted by Ibn al-Bayṭār after Ibn Wāfid, reports on the homeland and extraction of this highly appreciated perfume. According to him, the "musk gazelle" (*ġhazāl*, *zaby*) lives in a region belonging partly to Tibet, partly to China. For two reasons, the Tibetan musk is of higher quality than the Chinese one: firstly because the gazelles in Tibet graze the fragrant spikenard (*sunbul*, not lavender), whereas in China, other herbs; secondly, because the Tibetans leave the musk pouch as it is, while the Chinese take the secretion out of the pouches and add blood, or tamper with it in another way. Besides, the Chinese musk loses part of its quality because of humidity and climatic changes on the long sea journey from China to Near East. In Tibet, the musk gazelles are caught in nets, or killed with arrows. In size, colour and form of the horns, the animals resemble the Arabic gazelle. If the pouch is cut off before the secretion is ripe, the latter gives off an unpleasant smell which, after some time, under the influence of the air, takes on the real musk scent. The best musk is obtained when the secretion ripens completely inside the pouch. In this case, the animal senses a strong itching, from which it frees itself by grating against stones until the pouch bursts open and the contents come out. The Tibetans then go to look for the discharged secretion which has dried up in the air, put it in the musk pouch and take it to their princes. This high-quality musk is reserved for princes, who give it to each other as a present.

Others authors essentially affirm al-Masʿūdī's report, adding further data about the lands of origin. As such, India is mentioned, above all the kingdom of Mūḏja (perhaps Arakan, the coastal region of Western Burma), and also Further India, Ceylon and Java. From Central Asia, the musk came into the Islamic lands by the great caravan routes, and from East and South Asia by way of the sea, through the ports of Dārīn (Baḥrayn) and Aden. Even in faraway Spain, musk was the most important perfume.

The most detailed report on musk is given by al-Nuwayrī. His main source is the *Kitāb al-ʿArūs* of al-Tamīmī, but he also quotes al-Yaʿḳūbī, Muḥammad b. ʿAbbās al-Miskī, Ḥusayn b. Yazīd al-Sīrāfī and Yūḥannā b. Māsawayh, who give more accurate data about the places of origin, the transportation and the entrepôts, as well as about the various qualities of the musk. Musk was very often tampered with, as may be seen from the substitutes quoted by al-Kindī (or one of his pupils) in his *Kitāb fī Kīmiyāʾ al-ʿiṭr wa 'l-taṣʿīdāt*.

Musk also played an important role in medicine. According to Arab physicians, musk intensifies and stimulates the senses, and dispels trouble and affliction. This is in line with the fact that musk, destined by nature to attract the female animal, with human beings has the effect of an aphrodisiac. It further strengthens the brains and eyes, is good for heart palpitation, is an antidote against venomous stings, against the deadly alkaloid of aconite and against ergot (*ḳurūn al-sunbul*), *secale cornutum*).

(A. Dietrich)

Bee

Naḥl (Ar.) is a singular noun with the value of a collective (sing. *naḥla*) designating domestic or social bees (apid family) (Pers. *naḥl*, Turk. *arı*, Kabyle *thizizwa*, Tamaḥaḳ *ehenkeker en turawet*, pl. *ihenkukar*) with the species *Apis mellifera/mellifica* in

Europe and North Africa and *Apis fasciata* in Egypt and the Near East.

One cannot trace here the primordial economic role that, thanks to honey, bees have played in man's nutrition since prehistoric times. The sedentary populations of the mountainous and wooded zones of the Mediterranean rim, following the example of the Greeks, very soon domesticated the bee and organised bee-keeping (*niḥāla, tarbiyat al-naḥl*, Turk. *arıcılık*) quickly took its place among agricultural activities, successfully taking over from the hazardous collection of wild honey.

With Islam, the bee's beneficial nature for humanity was clearly described in sūra XVI of the Ḳurʾān entitled precisely *al-Naḥl* "the Bees" and in which it is stated (verses 68–9): "Your Lord has revealed to the bees: Establish your dwellings in the mountains, in the trees and in the places built by men, then eat all the fruits. Follow meekly in that way the paths of your Lord./From the bodies of the bees comes forth a drink of various hues which is a healing for men". The Prophet Muḥammad confirmed this divine protection on several occasions; according to one of his *ḥadīth*s, "Every fly is destined for hellfire, except the bee". He said further, "Among the small creatures, there are four that should not be killed: the ant (*namla*), the bee (*naḥla*), the shrike (*ṣurad*) and the hoopoe (*hudhud*)". Finally, speaking of honey, he declared, "For you [Muslims] there are two remedies: the Ḳurʾān and honey". Besides, among the paradisial delicacies reserved for the elect are promised "Rivers of purified honey (*anhār min ʿasal muṣaffā*)", XLVII, 15). Several other maxims of the Prophet give the bee as a model to follow for every Muslim, as much in his private life as in the heart of the community; after the fashion of the industrious insect, all his acts will aspire to the good and the beautiful and reject the bad and the ugly. The physiological process of making honey (*al-ary*) in the body of the bee staying unexplained among the scholars of Antiquity, the Muslims saw in it a clear sign of divine intervention beyond human comprehension.

On the scientific level, it must be noted that the Arabic-speaking naturalists who spoke of the bees, such as al-Djāḥiẓ (3rd/9th century), Ḳazwīnī (7th/13th century) merely reproduced what had been said by Aristotle and then the poet Virgil and Pliny the Elder, and they add nothing new. Despite this, we find, in the 4th/10th century, an excellent synthesis of all that was known until then about bees in one of the *Epistles* of the Ikhwān al-Ṣafāʾ in which the representative of the bee race makes a vibrant indictment of man who, in every age, has exploited for his own profit the hard work of his fellow bees. Later, it is the authors of treatises on agronomy who, in applied zoology, deal with bee-keeping and, more especially, the Hispano-Arab agronomists such as Ibn Baṣṣāl of Toledo (5th/11th century) and Ibn al-ʿAwwām of Seville (7th/13th century). Finally, some practical information was supplied by the "calendars" on times for different operations which are necessary in the practice of bee-keeping, such as the *Calendar of Cordova*.

The internal life of the hive (*khaliyya, ʿassāla, kiwāra, shūra, mishwāra, mushtār*, Maghrib *djabḥ, djabḥa*, Syria *manḥala*, Kabyle *thighrasin*, Turk. *arı kovanı*) was quite well observed after Aristotle, and the three social categories comprising a community of bees were already recognised. This community formed from a swarm (*dabr, thawl, ḥizḳ, khashram*, Maghrib *farḳ, sirb*) is grouped around the "chief" (*yaʿsūb, amīr, malik*, Kabyle *agellid*, Pers. *pādishāh*, Turk. *kıral*) who reigns as sovereign and who, in fact, is the queen; but it was not until the 17th century that the two naturalists, the

Dutchman Swammerdam (1635–85) and the Frenchman R. Ferchault de Réaumur (1683–1757) discovered that this monarch is a female and that she is the only one who lays the eggs in the cells of the honeycomb after having been fertilised outside by the males. Until then, no-one had discovered the exact origin of the seed (*bazr, bizr*) which gives birth to the larvae of the broodcomb (*raṣaʿ, dud̲j̲ā, daysam*); it was most often attributed to the class of workers (*ʿassālāt, ʿāmilāt*) who constitute almost the whole population of the hive and who, alone, ensure its subsistence by producing the bee-glue (*ʿikbir, kh̲atm, dund̲j̲*), wax (*sh̲amʿ*, Pers. *mūm*, Turk. *balmumu*) and honey (*ʿasal* pl. *aʿsāl, ʿusūl, ʿusul, ʿuslān*; *miḥrān*; Turk. *bal*, Tamaḥaḳ, *turawet*). The third category of bees, in the hive, is that of the drones (*yamkh̲ūr*, pl. *yamākh̲īr*, Kabyle *agaïmru*, pl. *igwirma*, Turk. *eşek arısı*), males who are useful only for the fertilisation of a new young queen at the time of her exodus with her first swarm (*daysam, lūth̲, ridʿ, ṭard*) to found a new hive; as soon as their unique function as sires is completed, they are inexorably rejected and suppressed by the workers.

Since the distant time when man had the idea of setting up hives for bees, relieving them of their concern to search for a precarious natural refuge, bee-keeping remained "fixist", that is to say, the honeycombs were welded to the wall of the dwelling. It was only in 1780 A.D. that the Swiss F. Huber imagined the "moving section" (*naḥīta*, pl. *nuḥut*), thus initiating the modern apiarist technique known as "mobilist". The primitive hive, generally cylindrical in shape, could at first be made out of bark of cork-oak (the French term *ruche* "hive" coming from the Low Latin *rusca* "stripped of bark") or clay applied to a framework of wood or wickerwork; it could also be a large earthenware jar with a lid, or a hut of plaited straw, or, finally, as in Persia, a large whitewashed calabash outside a protective plastered wall. Whatever the model of hive used, the harvesting of the honey (*sh̲awr, sh̲iyār, taʿsīl*), after fumigating (*awm, ayām, d̲j̲alāʾ, d̲j̲alwa*) the interior by burning dry grasses or dung to neutralise the occupants, could only be done by smashing the "cake" (*sh̲ahd, ḳurṣ, hiff*) to detach it from the walls; the honey spread on them was recovered with the aid of wooden scrapers (*mash̲war, mish̲wār, miḥbaḍ, miḥd̲j̲ān, minzaʿa*) of different kinds. The modern hive in storeys (*ḳafīr*, pl. *ḳufrān*) with its moving sections, has greatly facilitated this operation; likewise, the fluting (*damg̲h*) in sheets of the wax forming the bases of the honeycombs, invented in 1857 by J. Mehring, further adds to the simplicity of the handling and considerably reduces the flow of honey. The architecture of the wax comb has never ceased to arouse admiration; the geometry of the assemblage of alveoles or cells (*nukh̲rūb*, pl. *nakh̲ārīb, th̲uḳba*, pl. *th̲uḳab*) in hexagonal section in which the eggs (*ʿamiyy*) of the broodcomb are enclosed and the young bees (*abkār*) develop, appears as a work of genius in the eyes of architects, for it does not leave the least interstice or space unoccupied, and the Arab authors see in this also divine inspiration.

As honey is made from different gathered nectars and as some time passes between its production and its collection, it may appear in several colours and various consistencies. On its formation, it is very runny (*wadīs*) and smooth-flowing (*saʿābīb*), and this is the new honey (*ṭirm, ṭārim, ṭarim*); then it congeals and hardens (*ḥamīt, d̲j̲als*). In the combs of a hive, it stays fluid (*dh̲awb, sh̲uhd*), whereas wild honey (*ʿasal al-barr, ḍarab, ḍaraba*), exposed to the air, becomes thick and white by natural alteration (*iḍṭirāb*). In the lands of Islam, among the most-appreciated honeys were the one called *balla* taken from the flowers of the honey mimosa (*Acacia mellifera*; *sanṭ ʿasalī, zubba*, Yemen *samur*) and the

one called *ʿaraba* plundered from the wild lavender (*Lavandula vera*; *khazam*, *khuzāma*). From Morocco to India, each region favourable for beekeeping had its famous honey, traded locally and exported. The Moroccan Sous also produced the excellent *matānī* rivalling the honeys of Kabylia, Egypt and Persia. Besides, the geographer al-Idrīsī (6th/12th century notes the commercial activity in honey and wax from Fās, Tahert, Algiers, Constantine, Djidjelli, Mostaganem and Bône. He also mentions the important apiarist work of the rural populations of the region of Barḳa and the mountains of Cyrenaica, whose honey used to go directly to the market in Alexandria. In Egypt, furthermore, Cairo used to receive, at the beginning of summer and by river, the honey of Ḳūṣ and Lower Egypt; the Egyptian beekeepers each year were able to carry out a removal of the hives, by boats, to areas where selected plants were the most abundant. The Egyptians used to consume large quantities of honey; it was, with dry raisins (*zabīb*), a principal element in the drink called *shamsī* of which they were very fond as well as in another alcoholic drink, *bitʿ*, a mixture of honey and wine. In the 4th/10th century, at the court of the Fāṭimid caliph al-ʿAzīz bi'llāh (366–86/976–96), the annual consumption of honey was five *ḳinṭārs* (about 225 kg). In the same period, the geographer Ibn al-Faḳīh al-Hamadhānī reports that the Egyptians "gain glory from their mead (*sharāb al-ʿasal*) which is preferred in their land to the wine of Babylon on account of its sweetness, its perfume and its heady power". Later, he adds: "The Egyptians say, It is in our country that there are the most slaves, honey in combs, sugar and candy and money… They also say, We have wax, honey and ostrich feathers". Within the Near East, ʿIrāḳ, Syria and Arabia equalled the Mediterranean countries in honey production, but, like that of Cairo, the scale of consumption of the large towns and capitals, Baghdād and Damascus, necessitated additional imports from Persia, with its famed honey from Iṣfahān, whether in combs with the wax, or virgin and pure or in an extracted dry form (*khushkandjubīn*). It is known, moreover, that in Persia, in the 7th/13th century, the tax on beekeepers was paid in kind, in the form of so many thousands of litres, which shows production at a very high level.

We are not able to enumerate all the pastries, side-dishes and sweets in which honey formed an essential ingredient, each land of Islam having its own specialities. It was the main sugary substance along with dates, for sugar cane (*ḳaṣab hindī*, *ḳaṣab al-sukkar)* was only cultivated in the delta regions of the Euphrates and Nile, and sugar from beet (*shamandar*, *shawandar*, *bandjar*, *ṣawṭala*, Maghrib *lift ṣūrī*, *lift ḥalū*) was not made until the beginning of the 13th/19th century. A very early Arab foodstuff was *talbīna*, a mixture of honey and flour or bran and which, according to a *ḥadīth* reported by ʿĀ'isha, was "a tranquilliser (*madjamma*) for the sick". It is certain that honey possesses many specific virtues, and ancient Greek and then Arab therapeutics recognised almost all of them. Al-Damīrī cites some of them for us, the majority of which are recognised by modern medicine. In the words of the Ancients, honey, a hot and dry element, is diuretic and laxative; it is a powerful tonic, an effective antidote against poison and rabies and an excellent preserver of perishable goods, meats and fruits, when they are brushed with it. Mixed with musk, it is a beneficial eye-lotion to cure cataract and other eye infections and, made into a salve, it gets rid of nits and lice. Finally, massaging with wax or chewing it helps to relieve worries and anxieties. Nowadays,

medical authorities recognise in honey its richness in dietetic elements, its beneficial action in cardiac equilibrium, its hepato-protective and sedative role, its antiseptic properties and its effectiveness in increasing the rate of haemoglobin of the blood. The same authorities conclude that the regular use of honey is a ticket to health and that it should be made part of the daily diet of sportsmen. We may thus conclude that the Ḳurʾānic statement "From the bodies of the bees comes forth a drink of various hues which is a healing for men" is amply confirmed. In current usage, the bee has only been made the subject of two proverbial metaphors; owing to its remarkable sense of direction, it has been said *ahdā min naḥla* "a better guide than a bee", and its untiring activity in going and coming has led it to be compared to the traveller exhausted by long journeys who returns *anḥal min naḥla* "thinner than a bee". Finally, the contradiction, in an individual, between his words and deeds has been stigmatised in this image: *kalām ka ʾl-ʿasal wa-fiʿl ka ʾl-asal* "language [sweet] as honey and action [violent] as the point of a pike".

(F. Viré)

Sugar

In Arabic *sukkar*, from Pers. *shakar* or *shakkar*, from Skr. *carcarā*, Prakrit *sakkarā*, the sap crushed from the sugar-cane (*ḳaṣab al-sukkar*) and solid sugar.

The origin of sugar cane and its early domestication cannot be precisely determined, but it evidently derived from the family of large *Saccharum* grasses which grow in India and Southeast Asia. From India, cultivation of the plant spread westward. Clear references to cultivation in Persia belong to the period immediately following the Islamic conquest, but it was possibly known somewhat earlier; papyrus evidence indicates that sugar cane was grown in Egypt by the mid-2nd/8th century and diffusion across North Africa was steady although its entry into areas of the Iberian peninsula under Muslim domination may not have occurred until the 5th/11th century. From Crusader times, the eastern coast of the Mediterranean and later Cyprus, were important sources of supply for Christian Europe.

Plant terms in Arabic frequently varied from region to region and possibly over time as well. Supposed synonyms can further lead to confusion. The same is true of the by-products of the sugar-cane resulting from different stages of preparation and refinement, that is, pressing, filtering and decocting. For example, two common terms for types of sugar are (*sukkar*) *ṭabarzad* and *sukkar nabāt*. Maimonides states they are the same, the latter replacing the former in Egypt, while Ibn al-Ḳuff lists them separately as distinct varieties. The difference appears to be that *ṭabarzad* set hard in moulds (sugar loaf) while *nabāt* set on palm sticks placed in the recipient where it was being prepared; *nabāt* was also produced from other substances such as rose syrup or violet syrup. Al-Anṭākī, on the other hand, describes *ṭabarzad* as produced by adding to the sugar one-tenth of its bulk in milk while the mixture cooked. This, however, may only have reflected a practice in Syria. Another common type of sugar was called *fānīd*, made in elongated moulds and which "melted quickly in the mouth"; its highly refined state was produced by adding the oil of sweet almonds or finely-ground white flour to the process of decoction. Finally, a sugar called *sulaymānī*, was made from hardened "red sugar" (*sukkar aḥmar*) broken into pieces and further cooked to remove any impurities.

Sugar was one of several substances used as a "sweetening" agent in mediaeval cooking as well as medical preparations. Honey, molasses (*dibs*) and fruit sugars were also commonly used. At times, their purpose served as a preserving agent for certain foods. It is impossible to judge the relative popularity of one sweetener over another. One medical writer, al-Tamīmī (d. late 4th/10th century) wrote of sugar that although "not one of the manna fallen from the sky" it was the "full brother of honey, its equal and associate". Its benefits included aiding the performance of ingested drugs, both laxative and non-laxative varieties, because it broke up their bitterness, softened any coarseness in their mixtures and eased their acceptance by the body, "conducting them to the very depths of the bodily organs". Sugar was described in Galenic terms as hot and moist. Despite its many benefits, sugar was nonetheless judged to be harmful to the stomach at times when yellow bile prevailed in it; the *ṭabarzad* variety, however, because it was less warm and moist than other sugars, was therefore less likely to be transformed into yellow bile. A number of medical receipts employing sugar are preserved in Abu 'l-ʿAlāʾ Zuhr's *K. al-Mudjarrabāt*, although they are considerably outnumbered by those using honey.

On the other hand, in a late culinary manual, the *Kanz al-fawāʾid*, sugar appears more frequently in preparations than honey. Moreover, unlike medical receipts in which sugar and honey rarely occur together, this is often the case in dishes prepared in the domestic kitchen. Dishes containing meat and vegetables were broadly classified as either "sour" (or "acidic", *ḥāmid*) or else "sweetened" by virtue of the presence of a sweetening agent which, in the case of sugar, could be added either during, or sprinkled on top of the dish at the end of the cooking process. The intention in other preparations was to produce a "sweet-sour" effect by combining vinegar with a sweetener. Sugar used in the household seems to have been purchased in a state which required it to be "crushed", "pounded", "powdered" (*madjrūsh*, *mahrūs*, *madḳūḳ*) in the kitchen itself; recipes instruct that the sugar used should be "pounded (in a mortar) and sieved". Sugar was used, therefore, in a wide variety of preparations including, naturally, sweetmeats such as the popular *kunāfa* and *sanbūsak*, pickle preparations and other condiments. Finally, it may be noted that sugar was also an ingredient in several kinds of "home remedies" such as the electuary (*maʿdjūn*), the stomachic (*djawarsh*) and medicinal powders (*safūf*) prepared in the household as aids for the maintenance of the general health and welfare of its members.

(D. Waines)

Saffron

Ar. *zaʿfarān*, saffron, *Crocus sativus* L. or *Crocus officinalis* Pers., is one of some eighty species of low-growing perennial plants of the family Iridaceae, found throughout the Mediterranean area, mid-Europe and Central Asia. A product, used in antiquity as an important source of yellow orange dye, was obtained from the stigma (*shaʿr*, *shuʿayra*) of the sterile cultigen *C. sativus*.

1. Domestic uses

Saffron was, and remains, also widely used in Middle Eastern culinary traditions. In the extant Arabic culinary manuals of the mediaeval period (4th/10th to 8th/14th centuries), ranging in provenance from ʿIrāḳ to the Iberian peninsula, saffron appears frequently in a wide vari-

ety of domestic preparations. A representative selection of recipes may be found in the anonymous *Kanz al-fawā'id*, probably of Mamlūk Egyptian origin.

In substantial dishes containing meat, often together with one or more vegetables, saffron was used to lend colour, a purpose sometimes explicitly stated in the recipe. For example, in a sweet-sour dish of Persian origin, *zirbādj*, chicken is tinted with saffron before vinegar is added to the cooking pot. However, in other cases, saffron is used to add flavour. One of the stages of preparation for *ṭabāhidja* calls for a combination of saffron with honey, nuts, corn starch, pepper and various spices mixed together and added to the pot. The complement of the distinctive aroma of saffron was likely intended when, in a meatless recipe, it was sprinkled with sugar and rosewater on top of the finished dish; indeed, saffron is often found in combination with aromatic rose water. A mustard sauce, *khardal*, containing saffron and other dried spices, was mixed with brown vinegar, the preparation being used to prevent the "transformation" of fish.

Other, less known, domestic uses for saffron were its frequent appearance, among many other ingredients, in preparations for "home remedies" such as stomachics (*djawārish*), one such being said to sweeten the breath and prevent snoring. Finally, *mā' za'farān*, a clear liquid distilled from saffron, was used to scent clothing without leaving a trace of its colour.

2. As a medicament

As well as being used in food preparation, saffron is one of the simple medicaments, abundantly cited in Arabic medical treatises. At the present time, it is used in traditional medicine of the Arab-Muslim domain (*ṭibb 'arabī, ṭibb yūnānī*). It has been used since Antiquity (cited in the *Iliad*, xiv. 348) as an aromatic, colourant and simple medicinal herb. In mediaeval Islamic literature it appears under various names: *za'farān* (the most common), *rayhaḳān, djādī, djādhī* and *djisān*. Dāwūd al-Anṭākī thought that the Syriac name of this herb was *kurkum*, but this term in fact denotes the curcuma, often mixed up with saffron on account of the similarity in colour. Saffron was cultivated in many parts of the Islamic world, but was also imported. Ibn al-'Awwām gives a precise description of the plant's cultivation in al-Andalus, near to Seville (*K. al-Filāḥa*, i, 116–18). There were various varieties known in the classical period: the Maghribī and the Edessan (*ruhāwī*), but also the Frankish or Genoese (*ifrandjī, djanawī*). Al-Bīrūnī mentions Persian varieties (*iṣbahānī, rāzī* and *khurāsānī)* and Syrian (*shāmī*) ones. The products of the Sūs, in southern Morocco, were especially appreciated, as stated by al-Anṭākī and the anonymous *Tuḥfat al-albāb*; contemporary Moroccan herbalists further mention the *za'farān zebbūdī* (cultivated by the Zebbūd of the Sūs).

Saffron was considered to be a stimulant for the nervous system, but also an aphrodisiac, a tonic for the heart and a cordial (*mufarridj*). It was used in the composition of collyria, as indicated by Ibn Sīnā and al-Anṭākī, since the powers of dissolving white specks in the eye and strengthening the eyesight were attributed to it. Finally, it was used as an emmenagogic, a diuretic and a lithotriptic, but also, on the fringes of magic, in amulets for helping with labour in parturition. At the present time, folk medicine uses the "ink" of saffron in the making of amulets bearing cabbalistic inscriptions aimed at combatting the evil eye. Another usage, fairly current in the medical treatises, is as a calming remedy for pains and inflammations of the ear. Since saffron was a precious and expensive product, fraudulent substitutes of all kinds were current, to the degree that

Kōhēn al-ʿAṭṭār devotes a section of his treatise to describing the techniques for verifying the authenticity of this simple (*imtiḥān al-zaʿfarān*). Most of the falsifications were done by using the curcuma rhizome (sc. that of *Curcuma longa L.*, *kurkum*) or the bastard saffron (*Carthamus tinctorius L.*, *ʿuṣfur*), because of their close resemblance to genuine or medicinal saffron.

(D. Waines, F. Sanagustin)

Olive Oil

The Arabic word *zayt*, in the classical lexicon, denotes the oil or expressed juice of the olive (*zaytūn*, botanical name *Olea europaea L.*), although it could apply today to any oil. Here only the use of olive oil will be discussed. In his Book on Dietetics (*K. al-Aghdhiya*), al-Isrāʾīlī (d. *ca.* 935) adds that oil extracted from any plant other than the olive was called *duhn*.

Cultivated throughout the Mediterranean basin since about 3,000 B.C., the fruit of the olive tree was used for cooking, as food, as a cosmetic and for lamp oils. It is in this last usage that *zayt* occurs in the famous Ḳurʾānic "Verse of Light" (XXIV, 35). This reference gave rise to Traditions from the Prophet who approved its use because it came from "a blessed tree". Graded according to the acidic content, the very best "virgin" oil would contain 1% of oleic acid, while poor oil with acidity too high for eating would be used as lamp oil. The term *zayt maghsūl* ("washed oil" or alternatively *zayt al-māʾ)* might refer either to the Roman technique of removing a bitter glucoside from the fruit by first soaking it in a solution of lye followed by a thorough washing, or by crushing the olives and then purifying the liquid by floating it on water. Al-Isrāʾīlī again notes that both the previously-mentioned terms refer to oil extracted (after crushing?) by means of hot water. On the other hand, in the dietetic treatise of the Andalusī author Abū Marwān ʿAbd al-Malik b. Zuhr (d. 557/1162), he says that the very best olive oil is taken from ripe olives that have not been mixed with salt or other substance, as this adulterates the fruit's moist elements and unbalances its nature; this may reflect a traditional Iberian taste for the more acidic grades of the oil.

Ibn Ḥabīb's (d. 238/853) small medical compendium preserves a couple of sayings attributed to the Prophet Muḥammad indicating the several uses of olive oil and its magical property of protecting from Satan for forty days anyone who is anointed with it. The composition of olive oil was described as hot and moist in the first degree. In the mediaeval Arab culinary tradition, represented by the anonymous *Kanz al-fawāʾid*, olive oil was employed in a variety of preparations. As a frying agent, it was also occasionally replaced by sesame oil (*shīradj*), as in the preparation of fish; in egg preparations, the two oils were often used together. Oil sprinkled over a prepared condiment lent its flavour to the dish. A mixture of salt, water and oil was used to clean chicken before cooking it, and oil was used in a herbal-based mixture in which to marinate fish.

(D. Waines)

Sesame

Simsim (Ar.) is sesame, a family of plants with some 16 classes, of which *sesamum indicum* or *sesamum orientale, Pedaliaceae*, primarily qualifies for consideration. Sesame is an ancient cultivated plant, whose habitat is probably in Central Asia and which spread in the tropics and sub-tropics.

The name can be derived from Akkadian *shamashshammu*, which became on the one hand Greek σήσαμον, on the other Arabic *sumsum* and the more usual *simsim* via Hebrew *shumshōn* and Aramaic *shushmā* (and variants). An often-used synonym is *djuldjulān*, wrongly interpreted by some authors as coriander (*kuzbara*). The greasy oil of sesame is indicated as *duhn al-ḥall* (*sic, al-khall* is wrong), as *ṣalīṭ djuldjulān* or *shīradj* (Persian *shīra*). The small, angular, yellow-white to black seeds are kept in elongated capsules which develop from the blossoms of the plant. In many countries, sesame is an important foodstuff. In India sesame flour is boiled into pulp, in Asia Minor and in Egypt bread and pastry are flavoured with sesame. If pressed when cold, sesame oil is liquid, odourless and of a pleasant taste. Like olive oil, it has served at all times as a valuable salad oil, and also as a substitute for butter fat (*samn*).

In medicine, sesame belongs to the softening and resolving remedies. When grilled and eaten with linseed (*badhr al-kattān*), it increases virility. It is quite efficient against breathing difficulties and asthma, as well as against coughing and hoarseness. Sesame may harm the stomach, but this can be avoided or alleviated if it is taken together with honey. Sesame herb boiled in wine is efficient against inflammation of the eye. Its oil is a remedy against raw and chapped skin and brings ulcers to ripening. Mixed with attar, it soothes headaches originating from sunburn (*iḥrāḳ al-shams)*. It is also used in cosmetics. In the bazaars of Cairo, sesame is sold in great quantities, but, in pursuit of profit, lotus seeds (*nīlūfar*) are often deceitfully passed off as *djuldjulān miṣrī*, and the seeds of the black poppy (*khashkhāsh aswad*) as *djuldjulān al-ḥabasha*. Finally, there were also "sesame-like" plants (*sisāmuwīdā*, σησαμοειδές), a large one and a small one, which were considered as classes of a wild sesame (*simsim barrī*).

(A. Dietrich)

Fig

Tīn (Ar.) is the common fig (*ficus carica*) and, after Lane, the tree of the *balas*; or, the tree and the fruit itself. Another tree and fruit resembling the *tīn* is called *djummayz*, the sycamore fig, a name included in some lists of simples and treated along with *tīn*. Widespread throughout the Mediterranean from antiquity, it is mentioned in both the Hebrew Bible and the Ḳurʾān (together with the olive, XCV, 1). There are dozens of species and hundreds of varieties, both cultivated and wild, covering a wide spectrum of flavour, sweetness, size and colour. The common fig needs no pollination and is seedless, while other varieties which produce seeds (e.g. Smyrna figs) require pollination with the aid of a species of small wasp. Figs are described as hot and dry, and any ill effects to the stomach may be avoided by washing out the mouth after eating them and drinking *sakandjabīn* (the classical oxymel). Apart from their known laxative property, they are said to dissolve phlegm, purify the kidneys and open obstructions in the liver and spleen. The juice of cooked figs (together with other ingredients) appears in several medical recipes mentioned by Abū ʿAlāʾ Zuhr (d. 525/1130). The fruit was apparently eaten most commonly unaccompanied, fresh or dried. One culinary preparation recommends how the dried fruit, filled with honey and saffron and steamed in a sieve over boiling water, creates the effect of a freshly tree-picked fig.

(D. Waines)

Apple

Tuffāḥ (A.) is the apple, *Pyrus malus, Rosaceae*. It descends from the asiatic Pyrus species and has spread in numerous varieties and cultivated forms, which have their centre of frequency in the Caucasus and in Turkestan. Most authors name the Syrian apples as the best ones, e.g. Thaʿālibī: "To Syria's particularities belong the apples. They are proverbial because of their beauty and scent. Every year 3,000 crates of these apples are delivered to the caliphs. It is said that those of ʿIrāḳ have a stronger scent than those of Syria".

The next-best varieties, according to the geographers, were *al-tuffāḥ al-iṣfahānī, al-ḳūfānī* (from Bayt Ḳūfā near Damascus, and thus a variety of the Syrian apple), then *al-malaṭī, al-miskī, al-dāmānī* (from Dāmān in Mesopotamia). The last-mentioned variety is also praised by Yāḳūt: it is said to be proverbial because of its redness. Because of their long storage life, these apples could be transported over long distances. The fact that they were given as valuable presents in Baghdād is also an indication of their great value. It is said that, at Iṣṭakhr, apples were grown whose one half had a sweet taste, the other a sour one.

In Egypt, on the other hand, the indigenous apples were said to be small and bad, and to have been but little cultivated. In former days, it must have been as it is now: the Egyptian apples ripen early and quickly and therefore are not tasty. It seems, however, that the cultivation of apples in Egypt was quite important in the early Islamic period. In the *funduḳ Dār al-Tuffāḥ* of the fruit market in Cairo, the imported apples were stored, auctioned and resold.

In pharmacology, it was mainly the skin that was used. The carrier of the scent of ripe apples is the ethereal oil in the skins. The leaves, blossoms and twigs are astringent, the unripe fruit more so than the ripe ones. The juice squeezed from the leaves is useful against poisons, while the blossoms strengthen the brains "in a miraculous way".

(A. Dietrich)

Orange

Nārandj is an Arabised substantive borrowed from the Persian *naraŋ* (derived from the Sanskrit, with the meaning of "red") and designating in a collective manner, in parallel with *laymūn*, hesperideous or aurantiaceous fruits, including oranges and lemons (modern Arabic *ḥamḍiyyāt*). The term *nārandj* has passed, at a relatively late stage, along with the introduction of these fruits, into the majority of European languages, sometimes with alterations (loss of the initial *n*). Thus, at the beginning of the 14th century A.D., French adopted the expression "la pomme d'orenge", while Spanish preserved the Arabic form with *naranja*. Arabic dialects have also retained *nārandj*, but under the forms *narendj, nanerdj* in Syria, Lebanon and Palestine and *larendj, lārendj* in Morocco. It is surprising that Ibn Manẓūr (7th/13th century) made no mention of the term *nārandj* in his copious *Lisān al-ʿArab*. Furthermore, it should be noted that in some Arabic-speaking countries, *nārandj* is not the prevalent term for the designation of hesperideous fruits; the names in usage are those which refer to their far eastern origin; thus in the Maghrib the expression *letshīna* ("from China", cf. German *Apfelsine*) may be heard. It is believed that Arab caravan-traders would have been responsible for introducing the orange to the Near East and the Maghrib, while the Portuguese would have brought it from

the Indies to Spain and Portugal, whence its current name *burtuḳāl/burtuḳān* (Turkish *portakal*) which has supplanted *narandj* in numerous local dialects; modern botanical science has created *burtuḳāliyyāt* to define these fruits. In Western Europe, the Crusaders are credited with the introduction of oranges and lemons, whence, for the latter, the old French name "poncire" (from the Provençal "pomsire" = Syrian apple).

From the scientific point of view, the hesperideous or aurantiaceous fruits are classed in the family *Rutaceae*, and as fruitgrowers began, by artificial means, to increase the number of types and varieties, the latter were distinguished in Arabic by local names other than *nārandj*, which seems to have been applied originally to the Bitter, or Seville orange (*Citrus aurantium amara* or *vulgaris* or *bigaradia*) also called *naffāsh*. The Common orange (*Citrus sinensis Osbeck*) is known, besides *nārandj*, by the names *Abū ṣuffayr, zuffayr*, and in the Yemen, *shamsh*. The Mandarin orange (*Citrus aurantium deliciosa, nobilis, madurensis*) is known as *Yūsuf Afandī, yūsufī*. The Grapefruit tree or shaddock (*Citrus decumana* or *macrocarpa*) is the *zunbūʿ, zanbūʿ*. Among lemons, it is the Cedrate tree or Adam's apple (*Citrus medica Risso*, var. *cederata*) which bears the greatest number of names with *utrudj, utrudjdj, turundj, ṭurundj, utrundj, matk, mutk, mitk, kabbād, tuffāḥ māhī, tuffāḥ māʿī* and, in the Maghrib, *ḳars, ḳāriṣ*. As for the Bergamot orange (*Citrus bergamia*), native to southern Italy, although called *laymūn aḍālya*, it is often confused with *zunbūʿ*, the Grapefruit tree; the perfume known as bergamot (*ʿiṭr barghamūt*) is extracted from it. The varieties of lemons are all included in the collective substantive *laymūn, līmūn, līm*, differentiated by the adjectives *ḥāmiḍ* for the Common lemon (*Citrus medica*) and *ḥulw* for the Sweet lemon tree (*Citrus aurantium aurantifolia* or *limetta*). The *laymūn baladī* or *banzahīr* is the Egyptian small lime (*Citrus limonum pusilla*).

The well-known legend of the "Golden apples of the Hesperides" guarded by the Nymphs, daughters of Atlas, and the Dragon, plucked away and carried away by Hercules for his eleventh "labour", a truly daunting task, has given rise to various hypotheses regarding the location of this fabulous orange-grove. It is supposedly located in Mauritania Tingitana, near the Phoenician trading-centre of Lixus (Larache), or in Cyrenaica, in the city of Hesperis (Benghāzī), or in Spain, near Gades (Cadiz), or, finally, in the "Fortunate Isles" (*al-Khālidāt*), the Canaries. All these imaginary interpretations are an invitation to contemplate the existence of a distant memory of the introduction, at a very early stage, of certain fruits of this kind into the western Mediterranean region, and the Phoenicians may well have had a hand in this.

It is impossible to ignore the primal place which citrus fruits of all types have occupied and continue to occupy in culinary preparations, as well as in baking, confectionery, perfumery and the making of refreshing drinks; orange-trees and lemon-trees supply flowers, fruits and leaves suitable for all these purposes. Arab authors writing about the culinary art in the Middle Ages have left us a large number of recipes and descriptions in which these fruits play a major role. Thus in the range of perfumes, odiferous powders include a powder made from the Cedrate tree (*utrundja*) and another from orange-blossom (*zahriyya*). Among drinks, orangeade and cedrate syrup were known; acidic juices were obtained from lemons and bitter oranges. Among cooked dishes, familiar examples are chicken with orange, meats with the juice of the bitter orange (*nārandjiyya*) or the lemon (*laymūniyya*) or with the pulp of one or

the other (*ḥummāḍiyya*). These fruits could also be salted and preserved. One of the major scented waters obtained by distillation continues to be orange blossom water (*māʾzahr*), an effective means of enhancing the flavour of desserts. Finally, the buds of the blossom of the bitter orange provide, in perfumery, oil of Neroli (*ʿiṭr al-ḳaḍḍāḥ, duhn al-*…) first extracted, in the 17th century, by an Italian princess of this name.

Arab agronomists, geographers and travellers of the Middle Ages have mentioned, in their works and accounts, citrus fruits and the places where they were cultivated. Thus following al-Idrīsī, in the 7th/13th century the Andalusian Ibn al-ʿAwwām, in his *Kitāb al-Filāḥa,* repeats that the Hesperides emanate from India. In the following century, the Moroccan Ibn Baṭṭūṭa, having spent a considerable period of time in that country, specifies three varieties which are cultivated there, one sweet, one bitter and one between the two called *ʿanba*, a kind of sweet lemon the fruit of which is salted while still green.

(F. Viré)

Apricot

Arabic *mishmish*, more rarely *mushmush*, in the Maghrib *mishmäsh*, is a masc. sing. noun with a collective meaning (singulative *mishmisha*), the apricot-tree and its fruit (*Prunus armeniaca*), of the Rosaceae family, and corresponding to Persian *zardālū, zardālūk* and Turkish *kayısı*.

It was for long considered as indigenous to Armenia (whence its scientific name), but in fact has been cultivated in China for about two millennia before our era and reached the Mediterranean region of the West in the historical ages of Athens and Rome via India, Persia, Iraq and Turkey. In Greece, Italy, North Africa and Spain it was soon acclimatised under the name of "Armenian apple" (ἀρμενιακόν μῆλον, *armeniacum malum*) and "golden apple" (χρυσομῆλον, *chrysomelum*), this last appellation being given also to the quince (*safarǧal*). Nevertheless, in Greece it was more commonly called by the adjective "early" (πραικόκιον, *praecox*), since it is one of the first of the juicy fruits (*fākiha*, pl. *fawākih*) to ripen in the spring; and it was from this Greco-Latin denomination that Arabic derived *barḳūḳ* which, according to region, is also applied to the plum (*iǧǧās, ʿayn al-baḳar)*. This loanword *al-barḳūḳ* yields in Kabyle *aberkok*, in Mozarabic *albericoque* and in Catalan *abercoc*, whence Old Fr. *aubercot* (12th century) and then modern Fr. abricot, Eng. apricot, Ger. Aprikose.

As early as the high Middle Ages, the Islamic lands which cultivated the apricot distinguished two categories of this fruit: on one hand, the varieties the kernel of whose stone was sweet and edible (*mishmish lawzī*) and on the other, those where it was bitter (*mishmish kilābī*). In the first category, by far the most sought-after and best-named variety was that called *ḳamar al-dīn* ("moon of religion") and *ḳaysī*, which had large juicy fruits perfectly suited for drying. In the 8th/14th century, the famous traveller Ibn Baṭṭūṭa on several occasions vaunts their excellence. He first tasted them at Ḥamāt in Syria (the *ḥamawī* variety), then at Iṣfahān and finally, in Anatolia where they are singled out as a speciality of the towns of Konya (*Ḳūniya*), Antalia (*Anṭāliya*) and Kastamonu (*Ḳasṭamūniya*). After drying, these fruits were exported to Syria and, above all, to Egypt. As foodstuffs, these dried apricots offered several advantages since, as well as keeping well, they also produced, after maceration in water (*naḳūʿ*) overnight, a refreshing and sweet-smelling drink and a tasty side-dish. It would be impossible to

enumerate the many dainties (*ḥalwiyyāt*), including pastries, confections of sugar, sweets and syrups, in whose composition apricots were used. In connection with dishes of cooked meat, Arabic works on the culinary art mention two recipes for stews involving apricots (*mushmushiyya*). Finally, in the pharmacopeia, the sweet or bitter kernel of the stone of the apricot yielded an "oil" (*duhn lubb nawā al-mishmish*) beneficial for the treatment of haemorrhoids, anal tumours and dysentery. In the Middle East at the present day, among the numerous varieties of apricots obtained by grafting, one sees always in the markets the *ḥamawī* and the *mishmish lawzī*, whose name has become by abbreviations *mishlawz*. Also to be found, according to region, are the *basūsī*, the *sindiyānī*, the *baladī* and the *ʿadjamī*, all with a sweet kernel.

In Syria, the name of *mushmush barrī* is given to the arbutus (*Arbutus unedo*) regarded as a kind of wild apricot because of the reddish tinge of its fruits; and, in botany, modern Arabic calls *mishmish Amūrīkā* the Mammea or Santo Domingo apricot (*Mammea americana*) and *mishmish al-Yābān* "apricot of Japan" the Kaki (*Diospyros kaki*).

(F. Viré)

Raisins

Zabīb (Ar.) are dried grapes, raisins, or currants. In the mediaeval Islamic culinary tradition, raisins were deemed indispensable for meat dishes of chicken or mutton with a sweet-sour character, such as those of Persian origin called *zirbādj* or *sikbādj*, in which the sweetness of the dried grapes (sometimes combined with another dried fruit like apricot or additional sugar) is balanced by the acidity of vinegar. In another kind of preparation, the meat is initially cooked in a vinegar and raisin stock. A dish called *zabībiyya*, probably of Egyptian provenance, was prepared from fresh fish with a sweet and sour spiced sauce poured over it. In the recipes for substantial main dishes, two kinds of raisin, *zabīb aḥmar and zabīb aswad are* mentioned. The best kind of raisin was large with a lot of flesh and small seeds.

Raisins occurred also in a variety of other domestic preparations. For example, a kind of "mustard sauce" to accompany fowl was made from raisin extract (*māʾ zabīb*) and pomegranate seeds (presumably the acidic variety) in which dried spices, crushed almonds and salt were "dissolved". Raisins were also used in the preparation of a beverage called *fuḳḳāʿ*, a sparkling, fermented beer-like liquor. Certain home-made remedies, like the electuary (*maʿdjūn*), called for a large quantity of raisins, the seeds of which had to be removed before cooking; the preparation was used to avoid stomach disorders after eating greasy, fatty foods.

In the mediaeval medical literature devoted to dietetics, raisins are described as moderately hot and moist in character and as having a fattening quality. Abū Marwān ʿAbd al-Malik b. Zuhr (d. 557/1162) was of the opinion that wine made from raisins was weaker than that produced from grape juice.

In the Prophetic medicine (*al-ṭibb al-nabawī*) tradition, raisins are also very positively judged for their many benefits. Ibn Ḳayyim al-Djawziyya (d. 751/1350) provides two traditions, albeit unsound ones, in which raisins are described by the Prophet as excellent food which sweeten the breath and remove phlegm and fatigue; they were also said to strengthen the nerves, calm anger and contribute to a clear complexion. In a similar work attributed to al-Suyūṭī (d. 911/1505),

Tamīm al-Dārī is reported to have given the Prophet some raisins, which he then shared among his Companions; the Prophet also had *zabīb* soaked in water which he would drink the following day. To the Prophet's attitude to raisins there is added Ibn ʿAbbās's caution that, while the flesh contained a healing property, the seeds were harmful and should be spat out. Nonetheless, according to the traditionist al-Zuhrī, their value in the religious life was that anyone who wished to memorise *ḥadīth* should eat raisins.

(D. WAINES)

4. FOOD AND CULTURE

Hospitality and Courtesy

Conventions of generosity, favor and respect to be observed while receiving and entertaining guests or in social relations in general. Although the Qurʾān places a great deal of stress on the need to be charitable to the poor (see poverty and the poor; almsgiving), the enormous emphasis on hospitality in Islamic culture seems to be derived from pre-Islamic Arab values and draws its greatest validation in ḥadīth, where it is seen as an integral part of faith. The practice of courtesy is enjoined in the Qurʾān and has received full elaboration in the Ṣūfī tradition as a method of purification as well as a way of life.

HOSPITALITY IN THE QURʾĀN AND ḤADĪTH

The offering of hospitality was deeply rooted in the value structure of Arab society before Islam and continues to be important in Muslim society. The concept of "manliness" *(muruwwa)*, as an emblem of one's sense of honor was embodied in a constellation of values that denoted the highest ethical standards of pre-Islamic Arab society and especially included lavish generosity and hospitality. The harshness of the desert environment and the serious risk of bodily harm encountered when traveling without the protection of one's tribe were mitigated by the common courtesy of offering any traveler hospitality for at least three days. It is evident from even a cursory reading of the Qurʾān that stinginess, hoarding and ignoring the needs of the poor were considered major moral flaws (Q 69:34; 74:44; 89:18; 107:1–7). The Qurʾān speaks repeatedly of the need to be generous and to give charity (where the root is *n-f-q* or *ṣ-d-q*, Q 2:215, 274, 280; 13:22; 22:35; 35:29; 57:7; 58:12; 76:8; 90:14–6), preferably in secret (Q 2:271; 4:38). Finally, in the Medinan period the institution of almsgiving (*zakāt*) guaranteed some provision for the poor and wayfarers (Q 2:273; 9:60). Feeding a poor person is also offered as a means of expiation for failing to observe religious obligations (Q 2:184, 196; 5:89, 95; 58:4) and providing food for the poor became an integral part of the observance of the major Muslim feast days, the breaking of the Ramaḍān fast and the sacrifice during the pilgrimage (Q 22:28).

The Qurʾān has little to say about the broader practice of hospitality—inviting and providing for the needs of guests—or the elaborate practices of courtesy for which Muslim societies are often famous. This gap is largely filled by ḥadīth and the sayings of eminent early Muslims, who extolled the offering of hospitality and the practice of courtesy, making them integral parts of the religion. When asked about "the best part of Islam," the Prophet is said to have replied, "Offering food and extending the greeting of peace *(tuṭʿim al-ṭaʿām wa-taqraʾ al-salām)* to those you know and those you do not know". Asked about the meaning of a "righteous pilgrim-

age" *(ḥajj mabrūr)*, he replied, "Offering food and speaking kindly" (*iṭʿām al-ṭaʿām wa-ṭīb al-kalām*). The Prophet is quoted as saying, "The angels do not cease to pray for blessings on any one of you as long as his table is laid out, until it is taken up". Among the many sayings of pious early Muslims is one from the Prophet's grandson, al-Ḥasan (d. 49/669–70): "A man will have to give an account for every expenditure he makes for himself, his parents, and those in his charge, except what he spends on food for his brothers, for God is too shy to ask about that." Although the Qurʾān stipulates that God has determined the life-span of each individual, Jaʿfar b. Muḥammad assures us that God does not count the time one is at table with his "brothers," so one should prolong such gatherings.

The book on eating in al-Ghazālī's (d. 505/1111) encyclopaedic work, *Iḥyāʾ ʿulūm al-dīn*, "Revival of the religious sciences", contains a large number of ḥadīths and sayings *(akhbār)* that encourage hospitality and provide guidelines for all aspects of this etiquette: issuing invitations, accepting invitations, the manner of eating and ending the gathering. It is noteworthy that al-Ghazālī's work, though Ṣūfī in orientation, devotes far more space to the virtues of offering food and the etiquette of offering and receiving it, than to the virtues of fasting, a practice often associated with Ṣūfism. Indeed, al-Ghazālī says that one should not refuse an invitation to eat because one is fasting, and that one's reward for making a brother happy by accepting hospitality will be greater than the reward obtained by fasting. Typical among the many ḥadīths he cites are these: "There is no good in one who does not offer hospitality"; "among the things which expiate sins and increase in rank are offering food and praying at night while people are sleeping". A person should not deliberately show up at a person's house at meal time, but if he is offered food and senses that the host really does want him to eat, he should stay. If, however, he senses that the host is offering food out of a sense of obligation, despite his reluctance, the visitor should not eat. The host obtains a spiritual reward through hospitality, and it became the practice of the early Muslims to be hospitable. Indeed, al-Ghazālī says, if the owner of the house is absent but you are sure he would be happy if you ate, go ahead and eat, for that is the way of the pious ancestors.

A host should not burden himself by going into debt in order to offer food to his guests—although in fact many do exactly that, so ingrained is the offering of hospitality in cultural mores. A hagiographic account of Shaykh Aḥmad Riḍwān of Egypt (d. 1387/1967) says: "The people knew no one equal to him in generosity in his day… He gave like one who has no fear of poverty, from all the wealth, food or clothing that God gave him". This reflects a description of the Prophet himself, whose generosity to even the most rude and demanding nomads prompted one man to urge his tribesmen to become Muslims: "For Muḥammad gives like one who has no fear of poverty".

There are stipulations concerning the type of person to whom hospitality should be extended. A person should invite only righteous people to share his food: "Feeding a pious man strengthens him for obedience, but feeding a depraved man strengthens him for depravity," while a ḥadīth relates that it is wicked to invite only the rich. Conversely, acceptance of an invitation should not take into account the wealth of the host. Al-Ghazālī tells us that al-Ḥasan once greeted some people who were eating scraps in the road, and they invited him to join them. He agreed,

in order not to be proud, and later returned the courtesy by inviting them to a fine meal. Al-Ghazālī's injunctions on eating and drinking include so many prayers and rules of etiquette that meals are literally transformed into religious rituals.

Hospitality in Ṣūfī life

Drawing upon qurʾānic concepts of God's generosity, early Ṣūfīs cultivated an attitude of absolute dependence on God and an expectation that he would provide for all their needs; in consequence, they often refrained from asking others for food. They were also deeply suspicious that food offered by others could be "doubtful," that is, obtained through possibly illicit means or paid for with money earned in a dubious fashion. Al-Hujwīrī (d. 465/1072) and al-Ghazālī cautioned that a Ṣūfī should never accept the food of a rich man. Muḥammad Aḥmad Riḍwān, father of the previously-mentioned Aḥmad Riḍwān, demonstrated the continuity of this early attitude when he refused to go to the homes of government officials and declined to accept invitations to eat, cautioning that "most food these days is doubtful". In contrast, the giving of hospitality became an integral part of Ṣūfī practice. Al-Hujwīrī details the regulations for residents of a Ṣūfī convent *(khanqāh)* and requirements of offering hospitality to traveling Ṣūfīs and, for the traveler, of receiving such hospitality. In the Ṣūfī gatherings of modern Egypt, centers for devotion, spiritual retreats, and hospitality, the importance of offering food to travelers is reflected in the enormous concrete tables that are sometimes built into the very floors and are able to accommodate one hundred diners at a single sitting. Al-Qushayrī (d. 465/1072) tells the story of a young man who was fasting and refused to break his fast to eat with Abū Yazīd al-Biṣṭāmī (d. 261/874) and two other shaykhs, although they promised him the spiritual reward of a month's or a year's fasting for the blessing of sharing this meal with them. The young man's failure to obey the desires of his spiritual superiors caused him to fall out of God's favor, become a thief, and lose his hand. This anecdote is intended to warn disciples of the dangers of disobedience to shaykhs but it also reflects the notion that food offered by a saint carries the saint's blessing *(baraka)* and should not be refused.

Hospitality is one of the most important aspects of the celebration of saints' days *(mawlid)* in modern Egypt. Many devotees of the family of the Prophet (*ahl al-bayt*, which in Egyptian understanding includes most of the hundreds or thousands of saints buried in Egypt) set up hospitality stations *(khidma*, pl. *khidam*, *-āt)* in large canopied tents or simply on a cloth spread out on the sidewalk or in rented rooms in schools or other public buildings. Visitors are invited to receive at least a drink and, often, a meal as well. Such gifts, called *nafḥa*, a term which means both "gift" and "fragrance," convey the *baraka* of the saint and may not be refused. Many poor people gravitate to the *mawlid* to take advantage of the charity, but the wealthy likewise eat, in order to receive the saint's *baraka*, regardless of whether one is hungry or not.

The meaning of food offering is interpreted according to the social context. When a shaykh offers food, he is offering his own *baraka*, and a blessing is conveyed to the person who eats it. A devoted follower of a shaykh may even wish to eat the shaykh's leftovers or drink from his cup. When a shaykh accepts an invitation to eat at someone's home, he brings *baraka* to the house when he enters, and he honors the host by partaking of his food. Hierarchy and submission are

expressed not by the mere act of offering food, but by the dispensation and reception of blessing.

Courtesy and etiquette (*adab*)

The Qurʾān frequently enjoins the practice of courtesy: in speech—offering greetings (Q 6:54; 24:61), returning greetings with equal or greater courtesy (Q 4:86), using gentle words (Q 17:53; 35:10), returning evil with good (Q 23:96; 41:34), arguing with opponents in a pleasant manner (Q 16:125; 29:46), quiet speech (Q 31:19); modest behavior (Q 24: 30–31); respect for privacy (Q 24:27); kindness to parents (Q 2:83; 4:36; 6:151; 17:23; 46:15); and, in general, observing social conventions for politeness and moral rectitude (*al-maʿrūf*, e.g. Q 3:104). As important as the giving of charity is in the Qurʾān, "kind words and forgiveness are better than charity followed by injury" (Q 2:263).

Given the fact that many pages of ḥadīth are devoted to *adab* and most of al-Ghazālī's four-volume *Iḥyāʾ* is conceived as an elaboration on the etiquette to be observed by a pious Muslim, little more can be done here than to emphasize its importance and centrality in Muslim life. The Qurʾān describes the servants of the Merciful as those who walk lightly on the earth and return the speech of the ignorant with greetings of peace (Q 25:63). Ḥadīths concerning the importance of good manners are abundant. Among the virtues extolled here are generosity, modesty, kindness to parents and to children, honoring one's guests, avoiding harmful words and glances, and treating others in a manner in which one would like to be treated. To these al-Ghazālī adds the virtue of silence and the danger of much talking. Good manners are of the very essence of faith, and much literature is devoted to elaborating on their importance.

Etiquette reached full elaboration in Ṣūfī literature. The *Kitāb al-Futuwwa* by al-Sulamī (d. 412/1021) is a Ṣūfī manual of etiquette that consists mainly of wise injunctions and short anecdotes illustrating the importance of altruism, generosity, and sensitivity to others. Relationships in the Ṣūfī orders are governed by a lofty code of ethics and a standard of courtesy that are essential to traveling the spiritual path. One must observe proper etiquette with God, with one's shaykh, with one's fellow-disciples, with the entire Muslim community, and with non-Muslims. Al-Qushayrī supplies a number of sayings emphasizing the centrality of *adab* to faith. Etiquette is intimately connected with morality *(akhlāq)* in Ṣūfī writings, and the Prophet's wife, ʿĀʾisha, is quoted as saying, "His morals were the Qurʾān." The Qurʾān also commends Muḥammad as having an excellent character (Q 68:4) and, according to one ḥadīth, Muḥammad said, "I was sent only to perfect morality". Shaykh Aḥmad Riḍwān said, "The people of God's presence are humble and speak softly, unlike the people of the world".

Valerie J. Hoffman

III Medicine Dietetics and Pharmacology

1. Greek into Arabic

Translation

Tarḏjama (Ar., pl. *tarāḏjim*), verbal noun of the *verb tarḏjama* "to interpret, translate, write the biography of someone (*lahu*)".

1. Translations from Greek and Syriac

Tarḏjama (Arabic), and the Persian and Turkish forms, *tarḏjuma* (*kardan*) and *tercüme* (*etmek*), are the most commonly used terms for "translation" from one language to another. Two other terms used in this sense in Arabic, especially in the first few centuries of Islam, are *naḳl* and, to a lesser extent, *tafsīr*.

Translation had played a crucial role in the cultural history of multilingual Near Eastern peoples ever since the beginning of the second millennium B.C., with the translations of Sumerian texts into Akkadian. The conquest of the Near East by Alexander the Great and the ensuing spread of Greek and Hellenism led to two significant developments, before the rise of Islam, in the two major indigenous linguistic and cultural groups, the Aramaic and the Persian. Among the former, considerable sections of whom had in the meantime embraced Christianity, an initial attitude of antagonism against pagan Hellenism eventually gave place to assimilation just at the time when the Muslim Arabs were moving into Syria and Palestine. Helped by their knowledge of Greek and their training in the study of the Greek church fathers, Syriac-speaking scholars were translating in the 7th century pagan Greek works, primarily in the fields of Aristotelian logic and medicine. In the Sāsānid empire, the devastation of Alexander's conquests was incorporated into an imperial ideology that simultaneously glorified the Sāsānid dynasty and promoted the assimilation of Hellenism through translations from Greek into Pahlavi, which appear to have reached their high point during the reign of Khusraw Anūshirwān (A.D. 531–78). As the *Dēnkard* IV has it, Alexander's conquest caused the books containing the Avesta and the Zand to be scattered throughout the world, but the Sāsānids, starting with their founder, Ardashīr I,

took it upon themselves to collect these texts as well as other non-religious writings on science and philosophy which were conformable to Zoroastrian teachings. In this fashion, philosophical and scientific writings of all cultures were seen as ultimately either derived from or conformable with the Avesta, and translation as the means to "repatriate" them into Persian. This culture of translation in late Sāsānid times, officially sponsored by the state, continued even after the fall of the Persian empire, and during the Umayyad and early ʿAbbāsid periods gave rise to numerous translations from the Pahlavi into Arabic.

With the advent of Islam and a new political order, yet another language with universalist claims, the last in a long series, made its appearance in the Near East. The move of Arab rulers and tribesmen into areas whose populations did not speak Arabic made translation into Arabic inevitable both in government circles and in everyday life during the Umayyad period. Necessity dictated that, for reasons of continuity, the early Umayyads keep both the Greek-speaking functionaries and the Greek language in their imperial administration in Damascus. Sarḏjūn b. Manṣūr al-Rūmī (the Byzantine), who served as secretary to the first Umayyad caliphs from Muʿāwiya to ʿAbd al-Malik, was asked by the latter to translate the administrative apparatus (*dīwān*) into Arabic. Also related to the needs of the ruling élite in Umayyad times was the translation, sponsored by Hishām's secretary Sālim Abu 'l-ʿAlāʾ, of the Greek mirror for princes literature in the form of correspondence between Aristotle and Alexander the Great. Similar needs must have occasioned the translation of the Syriac medical compendium (*kunnāš*) of Ahrun by Māsarḏjawayh, allegedly for Marwān I or ʿUmar II, if indeed the sources in this regard are to be relied upon. In private life, social and commercial intercourse in Syro-Palestine and Egypt, heavily Greek-speaking until well after the end of the Umayyads, made translation a quotidian reality. Bilingual Greek and Arabic papyri of deeds and contracts attest to this fact for 7th–8th century Egypt; the practice was doubtless ubiquitous. Due also to the existence of numerous Greek speakers in these areas, translation from the Greek must have been easily available on an individual basis to everybody, scholar or otherwise. Even as late as the 4th/10th century, Ḥamza al-Iṣfahānī relates how he asked a Greek prisoner of war and his son to translate orally for him a text on Graeco-Roman history. All these activities of translation during the Umayyad period are instances of random and *ad hoc* accommodation to the needs of the times, generated by Arab rule over non-Arab peoples. Deliberate and planned scholarly interest in the translation of Greek works (and Syriac works inspired by Greek) into Arabic appears not to have been present in Umayyad times. The report that the prince Khālid b. Yazīd had had Greek books on alchemy, astrology, and other sciences translated into Arabic has been demonstrated to be a later fabrication.

It was with the accession of the ʿAbbāsids to power and the transfer of the seat of the caliphate to Baghdād under Manṣūr that translation into Arabic from Greek (on occasion through Pahlavi or Syriac intermediaries) became a movement, a historically significant social phenomenon. What sets the translation movement in Baghdād apart from the incidental translation activities of Umayyad times and other periods of Islamic history is that it lasted uninterruptedly for well over two centuries, that it was commissioned by both the ʿAbbāsid aristocracy and the majority of all literate classes of Baghdādī

society, that it was financially supported with an enormous outlay of funds, both public and private, and that it eventually proceeded on the basis of a scholarly methodology and philological exactitude that spanned generations and reflected, in the final analysis, a social attitude; more than any other characteristic it defines the public culture of early Baghdādī society. At the end of the Graeco-Arabic translation movement, the majority of pagan Greek books on science and philosophy (high literature and pagan history were excluded) that were available in Late Antiquity throughout the eastern Byzantine empire and the Near East had been translated into Arabic. To these should be added a few other marginal genres of writings, such as Byzantine military manuals, popular collections of wisdom sayings (gnomologia), and even books on falconry. In sheer quantity of volumes translated, let alone in quality of translation, the achievement was stupendous.

Historical sources credit Manṣūr with having initiated the translation movement. The ʿAbbāsids came into power as the result of a civil war, and Manṣūr addressed the task of reconciling the different interest groups that participated in the ʿAbbāsid cause and legitimising the rule of the ʿAbbāsid dynasty in their eyes by expanding his imperial ideology to include the concerns of factions that were carriers of Sāsānid culture. These included, among others, Persianised Arabs and Aramaeans, Persian converts to Islam, and especially Zoroastrian Persians—at the time of Manṣūr still the majority of Persians—who, as a number of Persian revivalist insurrections of the time indicates, had to be convinced that the Islamic conquests were irreversible. This was done by promulgating the view that the ʿAbbāsid dynasty, in addition to being direct descended from the Prophet, was at the same time the successor of the ancient imperial dynasties in Mesopotamia, culminating in the Sāsānids. As the most effective means for the diffusion of this ideology, Manṣūr incorporated the translation culture of the Sāsānids as part of his overall imperial ideology, and employed the same technique as the Zoroastrians did for spreading *their* millennarianism: astrological history (political astrology), i.e. accounts and predictions of dynastic reigns in terms of cyclical periods governed by the stars. His court astrologer, Abū Sahl b. Nawbakht, composed a book in which he incorporated the account of the transmission and preservation of the sciences from *Dēnkard* IV (mentioned above) and placed heavy emphasis on the role of translation in the renewal of knowledge as ordained by the stars for each people. Astrological history performed for Manṣūr and his immediate successors both a political function in that it presented the political dominion of the ʿAbbāsid state, whose cycle was just beginning, as ordained by the stars and ultimately by God, and hence inevitable, and an ideological function in that it inculcated the view of the ʿAbbāsids as the legitimate successors, in the grand astrological scheme of things, of the ancient Mesopotamian empires, something which entailed translation of ancient texts as part of the renewal of sciences incumbent upon each imperial dynasty. Al-Manṣūr's adoption of this aspect of Sāsānid ideology and its culture of translation indirectly initiated the Graeco-Arabic translation movement and gave it official sanction.

The initial translations of Greek works were made from Pahlavi intermediaries or compilations, and they were preponderantly of astrological character, as ʿAbbāsid interest in political astrology required. However, the translation movement was further invigorated and its role enhanced

also by other causes which uniquely combined to sustain it for well over two centuries. The exigencies of religio-political confrontation played a major role. Religious debate within Islam and polemics between Islam and other religions became particularly acute after the ʿAbbāsids came to power, both because the revolution raised expectations that were bound to be thwarted and because of the universalist claims of Islam as a religion put forth by the new imperial ideology. Under Mahdī, attempts to resolve the conflict were on occasion violent—like his persecution of the Manichaeans who, long suppressed under the Sāsānids, re-emerged during the Umayyad period and returned en masse to ʿIrāḳ, the place of origin of their founder, Mānī—but for the most part they rested on disputation. The need to understand better the rules of dialectical argumentation prompted Mahdī to commission from the Nestorian Patriarch Timothy I, with whom he debated, a translation of the best handbook on the subject, Aristotle's *Topics*. Within Islam, there was injected into theological discussion a cosmological element, and in particular atomism, apparently by the Manichean sects. The need for an alternative cosmology occasioned the translation of Aristotle's *Physics*, a work which, like the *Topics*, was to be re-translated repeatedly. Further development of such discussions eventually led, by the middle of the 3rd/9th century, to the translation, in the circle of al-Kindī, of theologically significant Aristotelian and Neoplatonic texts.

By the time of the civil war between Amīn and al-Maʾmūn, the ideological orientation given to the ʿAbbāsid state by Manṣūr had won wide acceptance and the translation movement was firmly entrenched in the cultural life of Baghdād. Al-Maʾmūn, back in Baghdād as both a fratricide and regicide, made use, among other things, also of the culture generated by the translation movement in order to re-establish and expand the centralised authority of the caliph. He engaged in an intensive propaganda campaign that aimed at portraying him as the champion of Islam abroad and as the final arbiter about the true interpretation of Islam at home. In order to achieve the first objective, he initiated an aggressive foreign policy against the Byzantines, who were portrayed not merely as infidels but also as culturally benighted and inferior both to their own ancestors, the ancient Greeks, and to the Muslims, who appreciated and translated ancient Greek science. The cultural superiority of the Muslims was presented as being due to Islam itself as a religion: the Byzantines had turned their back to ancient science because of Christianity, while the Muslims had welcomed it because of Islam. Anti-Byzantinism thus became pro-Hellenism. The second objective could be achieved only by divesting the criteria for religious authority from the religious and *ḥadīth* scholars among the common people and concentrating them in the person of the caliph; this in turn could be effected only by making the caliph's personal judgment in interpreting the religious texts, based on reason, the ultimate criterion, not the dogmatic statements of religious leaders based on transmitted authority. One of the public relations campaigns through which these policies were pursued was the dissemination, by his commander and right-hand man, ʿAbd Allāh b. Ṭāhir, of the dream which al-Maʾmūn allegedly had about Aristotle. According to this original version, the philosopher states that personal judgment (*raʾy*) is the ultimate criterion for the best [political and religious] speech, thereby promoting both the rationalist Ḥanafī orientation of the *miḥna* as instituted by al-Maʾmūn and the philhellenism

of his campaign against Byzantium. The effectiveness of the dream depended on the culture of Hellenism generated by the translation movement, which it presupposed; the dream was thus the consequence of the translation movement, not its originator while at the same time it provided further incentive for its more aggressive prosecution.

The impetus given to the translation movement by ʿAbbāsid ideology was further sustained by secondary causes generated by it, which continued to be active even after the original ideologies ceased to be relevant. The ideological campaigns of Manṣūr and his immediate successors achieved what they were designed to accomplish; those of al-Maʾmūn, which aimed to re-establish the caliph's political and religious authority, suffered a setback with the termination of the *miḥna* under al-Mutawakkil and were subsequently rendered irrelevant by the humiliation of the office of the caliph at the hands of the Turkish military. By that time, however, the translation culture had become the fashion among the élite in Baghdād, who continued to support it well into the Būyid century (945–1055). Sponsorship was not restricted to any specific source; the sponsors came from all ethnic and religious groups that played politically and economically significant roles during the first two centuries of Baghdād: Muslim Arab aristocrats, foremost among whom were members of the extended ʿAbbāsid family; Nestorian Arabs who converted to Islam in office, like the Wahb family: secretaries, *wazīrs*, and scholars; Zoroastrian and Buddhist Persians who converted to Islam in office, like the Nawbakht, Munadjdjim, and Barāmika families: astrologers, literati, theologians, secretaries and *wazīrs*; Arabised Persian Muslims, like the Ṭāhirids: generals and politicians, and like the Zayyāt family: manufacturers and merchants, secretaries; and Arabised Persian Nestorians, subsequently converted to Islam, like the al-Djarrāḥ family: secretaries.

Equally as significant as the support of the political and social élite was the active sponsorship of scientists and scholars of all groups, who commissioned the translation of Greek texts for their practice and research. Noteworthy among them were Muslim Arab aristocrats like al-Kindī, scientist and philosopher; the Gondēshāpūr medical heads, the Persian Nestorian families of Bukhtīshūʿ, Māsawayh and Ṭayfūrī; and the upstart brothers, the Banū Mūsā, of questionable pedigree.

The translators from Greek and Syriac themselves belonged to the Christian churches dominant in the Fertile Crescent: Melkites (the Biṭrīḳ father and son, Ḳusṭā b. Lūḳā), Jacobites (ʿAbd al-Masīḥ b. Nāʿima al-Ḥimṣī, Yaḥyā b. ʿAdī), and Nestorians (the family of Ḥunayn b. Isḥāḳ, Mattā b. Yūnus). Ethnically, they were preponderantly Aramaeans, in some cases Arabs (Ḥunayn). Called upon by their various sponsors to translate Greek works into Arabic, they had the pre- and early Islamic Graeco-Syriac translations to fall back on as models; however, this proved of limited usefulness. The Graeco-Syriac translations of non-Christian texts did not cover the wide range of subjects in demand for translation into Arabic, and, having been made for scholarly purposes in completely different circumstances than those into Arabic, they were not subject to the keen criticism and demand for precision. The translators, therefore, on the one hand improved their knowledge of Greek beyond the level of Syriac scholarship, and, on the other, developed an Arabic vocabulary and style for scientific discourse that remained standard well into the present century. Throughout the various stages of the movement, the

translations themselves were repeatedly revised with three objectives in mind: greater fidelity to the original, a more natural Arabic style, and greater accuracy in the technical terminology. The translators, who worked as private individuals unaffiliated with any institution (the *Bayt al-ḥikma* was the ʿAbbāsid palace library whose chief function was to store Arabic translations of Sāsānid literature and history) invested time and effort into their work because it was a lucrative profession. Abū Sulaymān Siǧistānī said that the Banū Mūsā used to pay monthly 500 dīnārs "for full-time translation". Ḳusṭā b. Lūḳā, as a young man out to make his fortune, left his home town of Baʿalbakk and went to Baghdād where he translated, for pay, some of the books he had taken with him. The high level of translation technique and philological accuracy achieved by Ḥunayn's school and other translators early in the 4th/10th century was due to the incentive provided by the munificence of their sponsors, a munificence which in turn was due to the prestige that Baghdādī society attached to the translated works and the knowledge of their contents.

The translation movement was naturally transformed during the Būyid era into the Islamic scientific and philosophical tradition; by the end of the 4th/10th century, the work of scholars who wrote in Arabic far surpassed, from the point of view of the society that demanded it, the scientific and philosophical level of the translated works, and royal or wealthy sponsors commissioned original works in Arabic rather than translations of Greek works. Most of the seminal Greek works had been translated; for the little that was left untranslated there was no longer any social or scholarly need.

After the end of the translation movement there are almost no recorded instances, before the modern age, of Arabic translations from the Greek. On an individual level, it was always possible to find a Greek speaker in the Islamic world for oral translation; al-Ṣafadī's informant on Greek matters, for example, the famous scholar Shams Dīn al-Dimashḳī, would appear to have received his information from some such source in Damascus. The only exception is the Ottoman scholar Esʿad al-Yanyāwī who lived during the Tulip Period. Dissatisfied with the early ʿAbbāsid translations of Aristotle, he learned Greek from certain Greek functionaries in the Ottoman administration and translated anew into Arabic some Aristotelian treatises. This effort, which appears to have been short-lived, is to be seen as part of the trend for modernisation in 17th–18th century Ottoman culture through translations and compilations from European languages into Turkish, and, within that context, in relation to the resurgent Aristotelianism among Greek intellectuals.

The particular linguistic achievement of the early ʿAbbāsid Graeco-Arabic translation movement was that it produced a scientific literature with a technical vocabulary for its concepts, as well as a high *koiné* language that made Classical Arabic a fit vehicle for the intellectual achievements of Islamic scholarship; its particular historical achievement was to preserve for posterity both lost Greek texts and more reliable manuscript traditions of those extant. On a broader and more fundamental level, the translation movement made Islamic civilisation the successor to Hellenistic civilisation. As such, not only did it ensure the survival of Hellenism at a time when the Latin West was ignorant of it and the Byzantine East busy suppressing it, but proved that it can be expressed in languages and adopted in cultures other than Greek, and that it is

international in scope and the common property of all mankind.

(D. GUTAS)

Medicine (Ar. ṭibb)

1. MEDICINE IN THE ISLAMIC WORLD

Medical care in the Islamic world was pluralistic, with various practices serving different needs and sometimes intermingling. This medical pluralism allowed pre-Islamic traditional and magical practices to flourish alongside medical theories inherited from the Hellenistic world and drug lore acquired from India and elsewhere. The medical practices of pre-Islamic Arabia appear to have continued as the dominant form of care into the early days of the Umayyad caliphate. The nature of this medical care is known primarily through various *ḥadīth*s, which later formed the basis of a genre of medical writing called *al-ṭibb al-nabawī* (see below).

Sources tell us virtually nothing about the medical care extended to the four Orthodox Caliphs and little about the medical care outside the court. There is a story of an Arab named Ḥārith b. Kalada who is said to have held learned discussions with the Sāsānid ruler Khusraw Anūshirwān, to have studied medicine at Gondēshāpūr (see below), to have been sufficiently known for his care that the Prophet referred sick people to him, and who, according to some traditions, was connected with the final illnesses of Abū Bakr and ʿUmar. The therapy that he advocated, according to later biographical literature, reflects traditional practices of using locally available plants rather than the Hellenistic tradition generally associated with Gondēshāpūr. The accounts of Ḥārith b. Kalada were elaborated over time and include conflicting elements making it difficult to assess the historical figure. For similar reasons, it is difficult to determine the authenticity of reports regarding Ibn Abī Rimtha, who was supposed to have been a contemporary of the Prophet and to have practised surgery. It is evident that a need was felt to justify and defend the use of medicine by appealing to accounts which showed the Prophet and early members of the Muslim community having recourse to doctors.

Only a few meagre details emerge regarding the physicians serving the early Umayyad caliphs. The first Umayyad caliph, Muʿāwiya, is said to have employed a Christian physician of Damascus, Ibn Uthāl. The physician to the caliph ʿUmar b. ʿAbd al-ʿAzīz (99–101/717–20) is said to have been ʿAbd al-Malik b. Abdjar al-Kinānī, a convert to Islam who reportedly studied at the surviving medical school in Alexandria. One of the few Umayyad physicians known by extant writings, and possibly the first to translate a medical treatise into Arabic, is Māsardjawayh, sometimes called Māsardjīs, a Judaeo-Persian physician living in Baṣra. While some accounts have Māsardjawayh living at the end of the 2nd/8th or the beginning of the 3rd/9th century, others state that, for either the caliph Marwān I or ʿUmar b. ʿAbd al-ʿAzīz, he translated into Arabic from Syriac the medical handbook (*kunnāsh*) of Ahrun, a 7th-century physician of the Alexandrian medical school.

Modern historians have usually assigned a prominent role in the development of Islamic medicine to the city of Gondēshāpūr, in southwestern Persia, which in the 6th century was an outpost of Hellenism. It has been asserted that Gondēshāpūr had an important hospital and medical school which supported the translation of Greek and possibly Sanskrit

texts into Middle Persian and Syriac, but this interpretation has been challenged by recent historians. There seems to be no evidence that there was a hospital in Gondēshāpūr or a formal medical school. There may have been a modest infirmary where Greco-Roman medicine was practiced and a forum where medical texts could be read, as was the case in other towns such as Susa nearby to the west. The alleged prominence of Gondēshāpūr as a medical centre with hospital was possibly due to the dominance of Nestorian Christians amongst the early physicians at the ʿAbbāsid court who wished to claim the hospital as their idea and to establish a history to support their medical authority. Certainly, the Nestorian monopolisation of early medicine in Baghdād meant that the medicine they advocated, based upon Greek texts, was promoted over the rival practices of Zoroastrians and Indians or the native medicine of Arabia.

The influence of Gondēshāpūr upon early ʿAbbāsid medicine (if our sources are reliable) is evident in the prominent role given the Bukhtīshūʿ family of Nestorian Christian physicians. For eight generations, from the mid-2nd/8th well into the second half of the 5th/11th century, twelve members of the family served caliphs as physicians and advisers, often sponsoring the translation of texts and composing original treatises. In 148/765 the caliph Manṣūr, suffering from a stomach complaint, called Djurdjīs b. Djibrāʾīl b. Bukhtīshūʿ to Baghdād from Gondēshāpūr, where he had been the leading physician and author of a Syriac medical handbook. He eventually returned to Gondēshāpūr, where he died after 151/768, but his son was called to Baghdād in 171/787, where he remained until his death in 185/801, serving as physician to the caliph Hārūn al-Rashīd. The subsequent generations of Bukhtīshūʿ remained in Baghdād. The court physician to the ʿAbbāsid caliph al-Mutawakkil, the Christian physician Sābūr b. Sahl, was also said to have practised medicine in Gondēshāpūr before coming to Baghdād.

Early in the ʿAbbāsid caliphate, interest was directed toward medical and scientific works from older cultures, especially Greek—no doubt encouraged by the Christian court physicians who spoke or read Syriac and Greek. After translation was undertaken on a major scale, the Hellenistic and Byzantine medical theories and practices were completely accepted and integrated into the learned medical thinking of the day. The most influential of the Greek writings to be translated into Arabic were the compendium on *materia medica* by Dioscorides, various treatises by Rufus of Ephesus, the surgical chapter from the Greek encyclopaedia by Paul of Aegina working in Alexandria in the 7th century, and especially the voluminous medical writings and exposition of humoral medicine by Galen. The Hippocratic writings, while extensively used by some Islamic physicians, were not in general as direct a formative influence as the Galenic writings.

Early in the 3rd/9th century a foundation called *bayt al-ḥikma*, the House of Wisdom, was established in Baghdād for promoting the translation of foreign texts. The most productive translator (though his relationship with the enterprise called *bayt al-ḥikma* is unclear) was Ḥunayn b. Isḥāḳal-ʿIbādī, another Nestorian Christian but originally from al-Ḥīra in southern ʿIrāḳ. He translated into both Syriac and Arabic, often working in collaboration with others, including his son Isḥāḳ b. Ḥunayn and his nephew Ḥubaysh, the latter sometimes translating into Arabic the Syriac version made by Ḥunayn. Ten years before his death Ḥunayn recorded that of Galen's works alone, he had made

95 Syriac and 34 Arabic versions. Ḥunayn also composed original medical writings, including the very influential *K. al-Masāʾil fi ʾl-ṭibb li ʾl-mutaʿallimīn* and the ophthalmological treatise *K. al-ʿAshr maḳālāt fi ʾl-ʿayn*. Ḥunayn and other translators, such as the Melkite Ḳusṭā b. Lūḳā, had access to the court as advisers and learned men, and through their translations, as well as original compositions, their work was fundamental to the establishment of the classical Arabic scientific and medical vocabulary.

There are a number of early physicians who are not known to have made translations themselves but whose writings reflect the very early period of adaptation of foreign material. Foremost amongst this group was another Nestorian Christian, Ibn Māsawayh, whose father had been a physician in Gondēshāpūr before coming to Baghdād. Ibn Māsawayh composed a considerable number of Arabic medical monographs, on topics including fevers, leprosy, melancholy, dietetics, eye diseases and medical aphorisms. It was reported that Ibn Māsawayh regularly held a *madjlis* or assembly of some sort, where he consulted with patients and discussed subjects with pupils, amongst them Ḥunayn b. Isḥāḳ. At times, Ibn Māsawayh apparently attracted considerable audiences, having acquired a reputation for repartee. Another important figure was ʿAlī b. Sahl Rabban al-Ṭabarī, who died not long after 240/855. He not only summarised Greco-Roman practices in his compendium *Firdaws al-ḥikma*, dedicated in 235/850 to the caliph al-Mutawakkil, but also devoted a separate chapter to Indian medicine. Neither he nor subsequent writers, however, really tried to integrate the Indian material with Greco-Roman medicine. Approximately thirty other physicians who practiced before the last quarter of the 3rd/9th century are known by name and some by extant writings. By the end of the century the humoral system of pathology, particularly as had been advocated by Galen, formed the basis of nearly all the learned Arabic medical discourses.

Also in the 3rd/9th century there arose a genre of medical writing called *al-ṭibb al-nabawī*, or prophetic medicine, intended as an alternative to the exclusively Greek-based medical systems. The authors were clerics rather than physicians, and they advocated the traditional medical practices of the Prophet's day and those mentioned in the Ḳurʾān and *ḥadīth* over the medical ideas assimilated from Hellenistic society, sometimes blending the two approaches. One of the earliest examples is the 3rd/9th-century Shīʿī collection *Ṭibb al-aʾimma*. At about the same time, Ibn Ḥabīb al-Andalusī composed *Mukhtaṣar fi ʾl-ṭibb* based upon *ḥadīth*s concerned with medicine, while in thenext century Ibn al-Sunnī (d. 364/974) compiled a treatise on the subject that was used by later writers. In the 7th/13th and 8th/14th centuries, the genre became quite popular and it remains so today. The treatises by the historian al-Dhahabī, the Ḥanbalī scholar Ibn Ḳayyim al-Djawziyya, and Djalāl Dīn al-Suyūṭī (d. 911/1505) are still available in modern printings. Treatises on prophetic medicine flourished for centuries alongside those of the Greek-based humoral tradition. We know of a considerable number of treatises on *al-ṭibb al-nabawī*, but we do not have the names of any who were known for practising this type of medicine. The reason for this may be that our written sources are for the most part skewed toward the Greek-based system and omit details of other practices. It would seem that treatises on *al-ṭibb al-nabawī* were not considered detrimental to, or competitive with, medical practices based primarily upon Hellenistic

humoral medicine. Islamic plague tracts also had as their primary focus the collecting and interpreting of various *ḥadīth*s considered relevant to the concepts of contagion and transmissibility of disease and the proper reaction to such occurrences. Plague tracts also attempted medical explanations and remedies for plague, and sometimes a history of plagues up to the time of composition.

Following the rather rapid appropriation of Greek medicine (with a few Persian and Indian elements) that occurred in the 3rd/9th century, the organisation of the vast body of knowledge into a logical and accessible format became a primary concern. In the 4th/10th and early 5th/11th centuries, four comprehensive Arabic medical encyclopaedias were composed that proved to be particularly influential. Yet no modern critical editions or translations of these encyclopaedias are available. Two of these fundamental works were written by Abū Bakr Muḥammad b. Zakariyyāʾ al-Rāzī: *K. al-Manṣūrī fi ʾl-ṭibb* and *K. al-Ḥāwī*. The former, dedicated in 290/903 to the Sāmānid prince Abū Ṣāliḥal-Manṣūr b. Isḥāḳ, governor of Rayy, is a relatively short general textbook, while the latter was assembled posthumously from his working files of readings and personal observations. The *Ḥāwī* is a unique type of work in the history of medicine, and, even though it was so enormous that few could afford copies and was not tightly structured as mediaeval encyclopaedias usually were, it was frequently used by later physicians. It was not without its critics, however, for the *K. Kāmil al-ṣināʿa al-ṭibbiyya* by ʿAlī b. al-ʿAbbās al-Maḏjūsī was written in part as an attempt to redress the lack of proper organisation and insufficient attention to anatomy and surgery that is evident in the *Ḥāwī*. Al-Maḏjūsī dedicated his only treatise to the Būyid ruler ʿAḍud al-Dawla Fanā Khusraw, and it is one of the most comprehensive and well-organised medical compendia of early medical literature. Its division into two discrete parts, theoretical and practical, established a format common to later mediaeval medical writings. The fourth medical encyclopaedia of fundamental importance was *K. al-Ḳānūn fi ʾl-ṭibb* by Ibn Sīnā. Composed over a lengthy period of time as he moved westward from Gurgān to Rayy and then to Hamadān, the compendium consisted of five books: (1) general medical principles; (2) *materia medica*; (3) diseases occurring in a particular part of the body; (4) diseases such as fevers that are not specific to one bodily part; and (5) recipes for compound drugs. The first book sometimes circulated by itself under the title *al-Kulliyyāt*. Unlike al-Rāzī or al-Maḏjūsī, Ibn Sīnā did not name the sources from which he drew his material. These four attempts at collecting and systematising the rather unorganised Hellenistic and Byzantine medical literature were enormously successful in producing a coherent and orderly medical system. Their sheer size tended to emphasise their authoritative nature, reinforced by titles such as *al-Ḳānūn*.

The *Ḳānūn* was, however, not greeted everywhere with praise. In Spain, when Abu ʾl-ʿAlāʾ Ibn Zuhr, who died in 525/1130, was presented with a copy of the *Ḳānūn*, he so disliked it that he refused to put it in his library, preferring to cut off its margins for use in writing prescriptions for patients. He also wrote a treatise criticising the *materia medica* in the *Ḳānūn*. His students, like those of al-Rāzī before him, compiled his therapeutic procedures and case histories into a book, *K. al-Muḏjarrabāt*, following his death in Seville. His son, Abū Marwān b. Zuhr, wrote several important works, including *K. al-Iḳtiṣād* intended for a general audience and *K. al-Taysīr* concerned with

therapeutics. His compatriot Ibn Rushd wrote *K. al-Kulliyyāt*, which became one of the most influential medical writings from Spain. It remains to be investigated whether Islamic medicine in Spain developed with less dependence upon the ideas of Ibn Sīnā than elsewhere. Available evidence suggests that the *ḳānūn* of Ibn Sīnā had little influence in ʿIrāḳ, Syria and Egypt until the second half of the 6th/12th century, when Ibn al-Tilmīdh, a physician at the ʿAḍudī hospital in Baghdād who died in 560/1165, wrote a marginal commentary in a copy he transcribed (in part from Ibn Sīnā's autograph copy) of the *Ḳānūn*. The influence of the *Ḳānūn* is detectable in the *K. al-Mukhtārāt fi 'l-ṭibb* written in Mawṣil in 560/1165 by Ibn Hubal. In Persia, the *Ḳānūn's* influence is evident earlier, for the Persian handbook *Dhakhīra- yi Khʷārazmshāhī* by Djurdjānī, dedicated to the Khʷārazmshāh Ghuṭb al-Dīn Muḥammad (490–521/ 1097–127), is highly dependent upon the *Ḳānūn*.

Both al-Rāzī and Ibn Sīnā also wrote essays on individual topics. Al-Rāzī wrote an influential monograph on smallpox and measles, though the earliest essay on the subject was by Thābit b. Ḳurra. Amongst al-Rāzī's other essays was one on colic (*K. al-Ḳūlandj*) and one criticising Galen's medical philosophy (*K. al-Shukūk ʿalā Djālīnūs*). Some of his case histories are contained in his *K. al-Ḥāwī*, but many more (nearly 900) were recorded and assembled posthumously by his students under the title *K. al-Tadjārib*. Ibn Sīnā's medical monographs included essays on colic, on cardiac drugs and on bloodletting, as well as a didactic medical poem (*Urdjūza fi 'l-ṭibb*) that was especially popular (judging from the large number of extant manuscripts and commentaries, including one by Ibn Rushd). The 4th/10th-century writings of Isḥāḳ b. Sulaymān al-Isrāʾīlī, particularly that on fevers, were widely read, as were the writings of his pupil, the Tunisian physician Ibn al-Djazzār. The court physician to ʿAbd al-Raḥmān III, Abu 'l-Ḳāsim Zahrāwī, composed at Cordova an encyclopaedia of 30 books entitled *K. al-Taṣrīf li-man ʿadjiza ʿan al-taṣnīf* that had particular influence through its final book, which was devoted to surgery. In the second half of the 4th/10th century, Akhawaynī Bukhārī, a student of a pupil of al-Rāzī, composed the earliest medical compendium in Persian, *Hidāyat al-mutaʿallimīn fi 'l-ṭibb*. The general Arabic textbook, *K. al-Muʿāladjāt al-buḳrāṭiyya*, by Aḥmad b. Muḥammad al-Ṭabarī, court physician to the Būyid ruler Rukn al-Dawla is preserved in many manuscript copies and merits further attention from historians, while several of the treatises by the court physician to the ʿAbbāsid caliphs al-Muḳtadī and al-Mustanṣir, Saʿīd b. Hibat Allāh (d. 495/ 1101), deserve detailed attention, especially his *K. al-Mughnī fī tadbīr al-amrāḍ* and his medical-philosophical essay *Fī khalḳ al-insān*.

In the 5th/11th century an acrimonious debate occurred between two important physicians. ʿAlī b. Riḍwān was a self-taught physician, burdened by an enormous ego and a quick temper. He was appointed chief physician by the Fāṭimid caliph al-Mustanṣir, and attained great political power in Egypt, where he also wrote several treatises including *K. Daf' maḍārr al-abdān bi-arḍ Miṣr*, a discourse on climatological features of Egypt and their relation to public sanitation and disease, particularly plague. When Ibn Buṭlān, a Nestorian Christian from Baghdād educated under the leading physician of the day, arrived in Fusṭāṭ in 441/1049 and challenged Ibn Riḍwān's position, an exchange of ten increasingly vitriolic essays took place. The debate ostensibly centred upon an issue in Aristotelian biology, but was in fact motivated by enmity

and the desire to acquire social status or to protect it. Ultimately, Ibn Buṭlān was forced to leave, but rather than return to Baghdād he went first to Constantinople and then to a monastery, where he became a monk. Ibn Buṭlān composed a medical manual for the use of monks, a tract on how to detect illnesses in slaves that were for sale, a satirical piece exposing the shortcomings of a physician and other medical personnel (*Daʿwat al-aṭibbāʾ*), and the extremely popular *K. Taḳwīm al-ṣiḥḥa*, which in the course of 40 charts presents 210 plants and animals and 70 other items and procedures useful for maintaining good health. Neither Ibn Buṭlān nor Ibn Riḍwān appear to have been aware of the *Ḳānūn* of Ibn Sīnā.

Perhaps with Ibn Buṭlān's *Taḳwīm* as a model, synoptic charts became a common didactic element in Arabic medical literature. Such charts are found, for example, in the therapeutic handbooks of Ibn Djazla and Saʿīd b. Hibat Allāh, and in the treatises on *materia medica* of Ibrāhīm b. Abī Saʿīd al-ʿAlāʾī Maghribī (*fl.* mid-6th/12th cent.) and Ḥubaysh b. Ibrāhīm al-Tiflīsī (*fl.* end of 6th/12th century). As early as the 3rd/9th century, branch diagrams were used to illustrate the relationship between ideas or between related diseases. Ibn Māsawayh appears to have been amongst the earliest to employ them, though branch diagrams are also found in some Arabic copies of summaries (*djawāmiʿ*) of Galenic treatises. Another popular format for medical discourse was that of questions and answers. Ḥunayn b. Isḥāḳ employed the technique in his *al-Masāʾil fi ʾl-ṭibb li ʾl-mutaʿallimīn* and also in *al-Masāʾil fi ʾl-ʿayn*. Others followed suit, such as Saʿīd b. Abi ʾl-Khayr al-Masīḥī (d. 589/1193), court physician to the ʿAbbāsid caliph al-Nāṣir, in his introductory guide to medicine, *K. al-Iḳtiḍāb*. Didactic medical poetry was also a common device, though given little attention by modern historians.

The Ayyūbid and Mamlūk dynasties were noted for their patronage of physicians and hospitals. Al-Malik al-Nāṣir I Ṣalāḥ al-Dīn Yūsuf b. Ayyūb (Saladin) was said to have had no less than 18 physicians in his service, eight of them Muslim, five Jews, four Christians, and one Samaritan. These included the well-known Jewish physician and philosopher Maimonides (Ibn Maymūn) and Ibn Djumayʿ. The latter had a number of students, including Ibn Abi ʾl-Bayān al-Isrāʾīlī, the author of a formulary *Dustūr al-bīmāristān* for use in the Nāṣirī hospital.

Nūr al-Dīn Maḥmūd b. Zangī had founded a hospital in Damascus which was named after him the Nūrī hospital, and al-Malik al-Nāṣir I (Saladin) followed his example by founding in 567/1171 a hospital in Cairo called the Nāṣirī hospital. The development of urban hospitals was a major achievement of mediaeval Islamic society. The relation of their design and development to earlier poor and sick relief facilities offered by some Christian monasteries has not yet been fully delineated, but it is evident that the mediaeval Islamic hospital was a more elaborate institution with a wider range of functions.

The Islamic hospital served several purposes: a centre of medical treatment, a convalescent home for those recovering from illness or accidents, an insane asylum, and a retirement home giving basic maintenance needs for the aged and infirm who lacked a family to care for them. It is unlikely that any truly wealthy person would have gone to a hospital, unless they were taken ill while travelling far from home. Except under unusual circumstances, all the medical needs of the wealthy and powerful would have been administered in the home. Though Jewish and Christian doctors working in

hospitals were not uncommon, we do not know what proportion of the patients would have been non-Muslim. An association with a hospital seems to have been highly desirable for a physician, and some teaching occurred in hospitals, especially in Baghdād and later in Damascus and Cairo, but most medical instruction was probably acquired through private tutoring and apprenticeship.

The association of the Umayyad caliph al-Walīd I with the establishment of the first hospital in Islam has been demonstrated to be unjustified, and the formative role of Gondēshāpūr in their development has been overemphasised. Available evidence suggests that the first Islamic hospital was founded in Baghdād by order of Hārūn al-Rashīd. The most important of the Baghdād hospitals was that established in 372/982 by ʿAḍud al-Dawla and we possess the fullest information about the great Syro-Egyptian hospitals of the 6th/12th and 7th/13th centuries.

Following the death in 560/1165 of the head of the ʿAḍudī hospital in Baghdād, Ibn al-Tilmīdh, several physicians left Baghdād for Damascus and the Nūrī hospital. One of Ibn al-Tilmīdh's students to emigrate was Ibn al-Muṭrān (d. 587/1191), a Christian who converted to Islam and found in Ṣalāḥ al-Dīn a generous patron, enabling him to develop a personal library said to contain 10,000 volumes. Ibn al-Muṭrān's major writing, *K. Bustān al-aṭibbāʾ wa-rawḍat al-aṭibbāʾ*, consists of numerous quotations from earlier authorities interspersed with his own comments, somewhat in the style of al-Rāzī's *Ḥāwī* but on a smaller and more organised scale. The leading figure in the teaching of learned medicine in Syria and Egypt in the 7th/13th century was Muhadhdhab al-Dīn ʿAbd al-Raḥīm b. ʿAlī, known as al-Dakhwār (d. 628/1230), who had studied medicine with Ibn al-Muṭrān and in turn taught many students in Damascus, where he was associated with the Nūrī hospital. He established a *madrasa* which was devoted solely to instruction in medicine. The school opened in 628/1231, about a month after al-Dakhwār died, and it was still in existence in 820/1417 when it underwent repairs.

His two most famous students were Ibn Abī Uṣaybiʿa and Ibn al-Nafīs. Ibn Abī Uṣaybiʿa was born into a family of Damascene physicians and in his day was a noted oculist practicing at the Nūrī hospital. Today his name is more readily associated with his *K. ʿUyūn al-anbāʾ fī ṭabaḳāt al-aṭibbāʾ*, in which he gives the biographies of over 380 physicians and scholars. His work greatly expands the earlier bio-bibliographic accounts given by Ibn al-Ḳifṭī.

Ibn al-Nafīs, usually referred to in Arabic sources by his *nisba* al-Ḳurashī, was a noted jurist as well as a prolific writer of medical tracts. He undertook an enormous medical compendium called *K. al-Shāmil fi ʾl-ṣināʿa al-ṭibbiyya*, which was projected to extend to 300 volumes, of which he completed only 80 (portions are preserved in nine manuscripts). He also wrote on ophthalmology and produced a commentary on *K. al-Masāʾil fi ʾl-ṭibb* by Ḥunayn b. Isḥāḳ.

While the earliest epitome of the *Ḳānūn* seems to have been that by al-Īlāḳī (*fl.* 460/1068), a pupil of Ibn Sīnā, it was not really until the late 6th/12th century that a serious need was perceived for aids to understanding the *Ḳānūn*. The Egyptian Jewish physician Ibn Djumayʿ, who died in 594/1198, composed possibly the earliest commentary on the *Ḳānūn*. In the 7th/13th and 8th/14th centuries, commentaries and epitomes followed in rapid succession, and it was this industry of glossing and condensing the *Ḳānūn* that assured the encyclopaedia

its pre-eminent position in mediaeval medicine.

The most widely read of all abridgements of the *Ḳānūn* was that titled *K. al-Mūdjiz* written by Ibn al-Nafīs. He also composed a commentary on the entire *Ḳānūn* that became an authoritative work in its own right, and in it he criticised Ibn Sīnā for, amongst other things, spreading his discussion of anatomy over several different sections of the *Ḳānūn*. Ibn al-Nafīs then prepared a separate commentary on the anatomy which is preserved in several copies, one completed in 640/1242 some 46 years before his death, and in it Ibn al-Nafīs described the movement of blood through the pulmonary transit (the pulmonary circulation) some three centuries before it wasdescribed by Europeans. Ibn al-Nafīs spent much of his life in Cairo, where he died in 687/1288 bequeathing his house and library to the recently-constructed Manṣūrī hospital there.

In Damascus, an important pupil of both Ibn al-Nafīs and Ibn Abī Uṣaybiʿa was the Christian physician Ibn al-Ḳuff, who taught medicine in Damascus and composed what appears to be the only mediaeval Arabic treatise devoted solely to surgery. This manual (*K. al-ʿUmda fī ṣināʿat al-djirāḥa*) covered all aspects of surgical care except ophthalmology, which he considered to be a speciality with its own technical literature.

Only two areas of medicine developed their own extensive specialist literature: ophthalmology and pharmacology. Nearly every medical compendium had chapters on both subjects, but the most comprehensive coverage was to be found in the large number of monographs devoted solely to eye diseases or simple and compound remedies.

In pharmacology, Islamic writers surpassed their earlier models, primarily because their broader geographic horizons brought them into contact with drugs unknown to earlier peoples. Knowledge of medicinal substances was based initially upon the approximately 500 substances described by Dioscorides. From the formularies of Sābūr b. Sahl and al-Kindī, and a treatise on the medical régime for pilgrims to Mecca (*K. fī tadbīr safar al-ḥadjdj*) written by Ḳusṭā b. Lūḳā, it is evident that by the 3rd/9th century many medicaments were being used that were unknown in Hellenistic medicine, including camphor, musk, and sal-ammoniac, as well as commodities previously unknown to Europe, such as cotton. Numerous treatises were composed on *materia medica*, often with extensive philological interests. Most influential of all was the manual by Ibn al-Bayṭār, which was an alphabetical guide to over 1,400 medicaments in 2,324 separate entries, taken from his own observations as well as over 260 written sources which he quotes. His enormous manual formed the basis of many subsequent guides to medicinal substances. New equipment was also developed for pharmaceutics. "Albarello" is the name given today in Europe to drug jars having a contracted waist, the earliest examples of which were made in Syria in the 6th/12th century. There was also a large and varied industry of mortar and pestle design and production.

The topic of poisons was of great interest in both antiquity and in mediaeval Islam. Snake and dog bites as well as the ill effects of scorpions and spiders and other animals caused much concern, while the poisonous properties of various minerals and plants, such as aconite, mandrake, and black hellebore, were exploited. A particularly important Arabic treatise on antidotes was written in 669/1270 in Syria by ʿAlī b. ʿAbd al-ʿAẓīm al-Anṣārī. It not only describes plants found in Syria at the time, but incorporates extensive quota-

tions from other treatises, including some otherwise lost today, such as a treatise on antidotes by the Egyptian physician al-Tamīmī (d. 370/980) and an illustrated herbal by the Syrian Rashīd Dīn Manṣūr b. al-Sūrī (d. 641/1243).

Other topics were sometimes the subjects of monographs, but they did not generate a large specialist literature. Such topics included anatomy, colic, haemorrhoids, skin diseases, forgetfulness, headaches, melancholia, fevers, bloodletting, embryology, and care of children. In thecase of surgery, Ibn al-Ḳuff's book on it was not as influential as the surgical chapter from the encyclopaedia by Zahrāwī, which was illustrated with drawings of instrumentsand often circulated independently from the encyclopaedia. Other topics, such as leprosy and malaria were discussed in encyclopaedias and have interested modern scholars, but were not themselves the subjects of monographs.

In certain regions the functioning of medical practioners was overseen by a *raʾīs al-aṭibbāʾ* and/or a *muḥtasib*. Though little is known about the actual duties of the former, a number of manuals were written as guides for the latter. Prior to the 6th/12th century, the manuals only briefly mentioned the medical profession, and then mostly in relation to drugs, weights, and measures. Al-Shayzarī (d. 589/1193), a physician working in Aleppo, wrote a manual requiring that the Hippocratic oath be administered to physicians, oculists examined for their knowledge of Ḥunayn b. Isḥāḳ's *K. al-ʿAshr maḳālāt fi ʾl-ʿayn*, bonesetters tested with the Arabic version of Paul of Aegina's surgical chapter, and surgeons required to know a particular book by Galen. Later manuals repeated these requirements, but there is little evidence as to what extent such examinations were actually conducted. It has also been asserted that a mediaeval Islamic physician was granted a license (*idjāza*) following the completion of his education. There is, however, no evidence for a uniform, standardised, or controlled system of medical education, though there are preserved today a number of signed statements at the end of treatises that a student has read and understood a given text in the presence of the author or established physician. Such certifications are not equivalent to licensing a physician upon completion of an approved period of training, nor is the term *idjāza* found in such documents.

Magical and folkloric practices, as well as astrological medicine, also formed part of the medical pluralism. One of the most obvious uses of charms and incantations was to protect against epidemics, whose occurrences were devastating, unpredictable and little understood, but they were also used to protect against every sort of disease and misfortune as well as the evil eye. Certain verses of the Ḳurʾān were considered especially beneficial, and magical alphabets and other sigla were combined to form amulets, which (after the 6th/12th century) might include magic squares. That such practices were not the sole domain of the poor is evident in the magic-medicinal bowls made for Ayyūbid and Mamlūk rulers. Large numbers of magic-medicinal bowls are preserved today, engraved with magical symbols and Ḳurʾānic verses. According to inscriptions on the early specimens, they were thought useful for a variety of ailments, including stomach complaints, headache, nosebleeds, scorpion stings, bites of snakes and mad dogs, and would assist in childbirth. Curiously, neither the magic-medicinal bowls nor the talismanic shirts (of which a considerable number of Ṣafawid, Ottoman and Mughal examples are recorded) are mentioned in the written literature that has been so far examined.

The writings of learned physicians, such as al-Rāzī, are not entirely devoid of sympathetic magic, for occasional references are found to sympathetic remedies involving magical principles. Throughout the society, in varying degrees, there was room for popular explanations and cures alongside the more learned approaches.

In the 5th/11th century, Arabic medical theories and practices began to filter into Europe. One of the earliest to be translated was an abbreviated version of Ḥunayn b. Isḥāḳ's *K. al-Masāʾil fi ʾl-ṭibb*, known in Latin as the *Isagoge*, which was fundamental in establishing the basic conceptual framework of medicine in Europe. The major writings of al-Madjūsī (Haly Abbas), al-Rāzī (Rhazes), and Ibn Sīnā (Avicenna) were all translated into Latin by the mid-7th/13th century. The name Mesue was associated with several influential Latin treatises, only some of which were actually written by Ibn Māsawayh. The writings of Isḥāḳ b. Sulaymān al-Isrāʾīlī and Ibn al-Djazzār had considerable circulation through Latin versions, as did the *K. al-Kulliyyāt* (*Colliget*) of Ibn Rushd (Averroes). The surgical chapter by Zahrāwī (Abulcasis) enjoyed great popularity in Europe, as did the *Taḳwīm al-ṣiḥḥa* of Ibn Buṭlān, known as *Tacuim* or *Tacuinum sanitatis*. With only a few exceptions, no Islamic medical writers who lived after Ibn Buṭlān are represented by Latin translations of their writings. A subject of debate is whether a Latin translation of Ibn al-Nafīs's description of the pulmonary circulation was available in the 16th century.

In the 16th century, Europeans again became interested in medical practices in the Islamic world. For example, Leonhard Rauwolf travelled in Syria, Iraq, and Palestine from 1573 to 1575 to collect plant specimens and record customs. Before travelling there, he had read Latin translations of Avicenna, Rhazes and Averroes. In the next century, Joseph Labrosse (Fr. Angelus of St Joseph) went to Rome in 1662 to study Arabic for two years and then travelled to Iṣfahān to study Persian, where he used medicine as a means of propagating Christianity. Upon return to France he published in 1681 the *Pharmacopoea persica* which consisted of a Latin translation of the *Ṭibb-i shifāʾī* by Muẓaffar b. Muḥammad Ḥusaynī al-Shifāʾī (d. 974/1556) with comments by Labrosse. In the 18th century, two Latin translations of al-Rāzī's treatise on small-pox and measles were made at a time when there was much interest in inoculation or variolation for smallpox following the description around 1720 of the procedure in Turkey by Lady Mary Wortley Montagu, wife of the Ambassador Extraordinary to the Ottoman court. Pharmacopoeias in European vernacular languages continued to show the influence of Islamic pharmacology until the beginning of the 19th century.

2. Medical exchanges between China and the Islamic world

It has been often assumed that the battle near Talas in July 751, where Western Turks and Arabs destroyed the Chinese army, marks the end of direct Chinese influence in Central and Western Asia, but this assumption must be revised.

The two main channels of contact between the Chinese and the Muslim peoples during the Middle Ages were the continental Silk Road leading westwards from north-west China. The other one, the "Oceanic Silk Road", connected the south-west coast of China with India and Persia. This latter route especially served the exchange of herbal drugs and medical knowledge from both sides. This is evidenced, inasmuch as China is concerned,

by the work *Hai yao ben cao* ("Materia medica from the Oceanic route"), written by Li Xun, a Persian who knew Chinese well and became famous also as a Chinese poet. He lived in the 9th/10th century A.D. Many kinds of herbs which were imported from Persia and other Muslim countries, as well as the names of Chinese herbs which were exported to these countries, have been recorded in the work *Song Hui Yao* ("Historical records of the Song dynasty"). The widespread use of Chinese herbal medicine by Muslim physicians is attested already by al-Kindī (3rd/9th century) in his pharmacopoeia.

Chinese medicine soon gained increasing influ- ence. In his *Canon of Medicine*, Ibn Sīnā listed and recommended 17 medical herbs which, as he added, were "imported from China" (*yu'tā bihā* [*tud̲jlab*] *min bilād al-Ṣīn*). This is another piece of evidence of Sino-Arabic exchange of herbal drugs at that time. While the Muslim physicians generally followed Galen, Ibn Sīnā's pulse theory and pulse diagnosis followed more closely the Chinese pulse diagnosis, displayed e.g. in Wang Shu-he's book *Mai jing* ("Classic of pulses", 2nd century A.D.). There are many similarities between Ibn Sīnā's *Canon* and Chinese medical theories, e.g. in regard to the holistic understanding of the human body, the principles of combining medical herbal formulae, the process of aging and the rôle of the body fluids, alimentary therapy, etc.

Chinese medicine was especially promoted by the great historian Rashīd Dīn Faḍl Allāh Ṭabīb (*ca.* 645–718/*ca.* 1247–1318), who served three Īlkhān rulers as Grand Vizier. Being himself also a physician, Rashīd Dīn was interested in Chinese medicine. He had contacts with Chinese physicians and ordered one of his pupils to go to China and collect Chinese medical books. He had them translated into Persian and edited them, together with an extensive preface of his own, under the name *Tansuḳ-nāma*, "Book of precious information"; the subtitle given by Rashīd Dīn is "The Īlkhān's treasure book of Chinese sciences". Of this book, divided into 4 parts, only one part, together with Rashīd al-Dīn's preface, has been preserved in a unique Istanbul manuscript.

Its main part has been identified as commentary of a commentary on the *Mai jue*, i.e. "Pulse poem", which was very popular in China during the Song and the Yin-Yüan dynasties (12th–14th centuries). At that time, the *Mai jue* was by mistake attributed to Wang Shu-he. This mistake was repeated also by Rashīd Dīn, although the correct name *Mai jue* is also mentioned in the *Tansuḳ-nāma*. The quotations from the *Mai jue* have been embodied into the *Tansuḳ-nāma* in its original Chinese version, transliterated into Arabic letters, together with explanatory remarks. The manuscript of the *Tansuḳ-nāma* contains also several drawings of high quality displaying inner organs, the circuit of life-energy (*Ḳi*) and astronomical computations. Thus although this work is only fragmentarily preserved, it is of great significance for the history of Chinese medicine being the first version, known so far, of Chinese medical literature transmitted to the Islamic West.

(Emilie Savage-Smith, F. Klein-Franke and Ming Zhu)

Ḥunayn b. Isḥāḳ al-ʿIbādī

Ḥunayn b. Isḥāḳ al-ʿIbādī was the most important mediator of ancient Greek science to the Arabs. It was mainly due to his reliable and clearly written translations of Hippocrates and Galen, that the Arab physicians of the Middle Ages became worthy successors of the Greek.

Life

Ḥunayn was born in 192/808 in al-Ḥīra, where his father was a pharmacist. The *nisba* indicates that he was a descendant of the so-called *ʿibād*, *i.e.* Arab tribesmen who had once embraced Christianity and who after the rise of Islam remained faithful to the Syrian Nestorian church, refusing to adopt the new religion. Ḥunayn may be assumed to have been bilingual from his youth, for Arabic was the vernacular of his native town, and Syriac was the language of the liturgy and of higher Christian education. Later in life, when settled in Baghdād, he translated far more books into Syriac than into Arabic, in accordance with the wishes of his clients. He himself showed a certain predilection for the Syriac language at the expense of Arabic, which he blamed for its lack of an adequate nomenclature as compared with either Syriac or Greek or Persian. But in their Arabic translations he and his school avoided mere transcriptions as far as possible, and thus helped to forge the Arabic scientific terminology. He was also at pains to acquire a sound knowledge of Arabic grammar; he is even said to have studied it at Baṣra and to have brought from there al-Khalīl's *Kitāb ʿAyn*. That he had the advantage of meeting the famous grammarian personally, as Ibn Djuldjul and others point out, is impossible for chronological reasons. The Arab bibliographers unanimously attest that Ḥunayn was *faṣīḥ*.

How Ḥunayn acquired his astonishing knowledge of Greek is told by the eyewitness report of a certain Yūsuf b. Ibrāhīm, which does indeed sound very trustworthy. It relates that Ḥunayn began his study of medicine at Baghdād under Yūḥannā b. Māsawayh, the famous court-physician and director of the *bayt al-ḥikma*. But as Ḥunayn used to ask too many troublesome questions, he incurred the anger of his master, who eventually ordered him to leave his school. Ḥunayn then disappeared from the capital for more than two years. The narrator himself is silent upon his whereabouts, but some sources contend that he went to Alexandria, others that he was staying in *bilād al-Rūm*. When he came back, he was so thoroughly versed in the Greek language that he could even recite from Homer. Afterwards he was reconciled with Ibn Māsawayh, who also encouraged him further to translate from the Greek.

Under the caliph al-Mutawakkil Ḥunayn was appointed chief physician to the court, but he had to suffer great hardships through the capricious behaviour of this Commander of the Faithful. One day he fell a victim to an intrigue of his Christian colleagues. As he was an enemy of image-worship, they induced him to spit on an icon during an audience. This provoked the indignation not only of the Nestorian *katholikos*, but also of the caliph. Ḥunayn was flogged, put in jail and deprived of his whole estate, including his library. After six months he was set free and reinstated in his office, which he held until his death in 260/873. He had two sons, Dāwūd and Isḥāḳ. Both of them became medical practitioners; the latter, following in his father's footsteps, excelled in translating from the Greek, but concentrated more on philosophical works.

Translations

Ḥunayn is credited with an immense number of translations, ranging from medicine, philosophy, astronomy, mathematics to magic and oneiromancy. His Arabic translation of the Old Testament, made after the Septuagint, was regarded as the best among other renderings. So far as his versions are conserved, they can help in establishing the Greek text,

for Ḥunayn had Greek manuscripts at his disposal which were several centuries older than ours. They also represent a valuable substitute for some writings that are otherwise lost.

Thanks to the important edition of Ḥunayn's *Risāla… ilā ʿAlī b. Yaḥyā fī dhikr mā turdjima min kutub Djālīnūs bi-ʿilmih wa-baʿḍ mā lam yutardjam* by G. Bergsträsser, we possess a detailed report on the various translations of Galen that were available at his time. There exists a different recension of this *Risāla*, which was found some time later. Ḥunayn enumerates 129 titles, of which he himself translated about 100 into Syriac or Arabic or into both. The list is not exhaustive, however, for al-Rāzī wrote a special treatise *Fi ʿstidrāk mā baḳiya min kutub Djālīnūs mimmā lam yadhkurhu Ḥunayn wa-lā Djālīnūs fī Fihristih*. One must bear in mind that Ḥunayn wrote the *Risāla* after the complete loss of his library, a fact to which he repeatedly refers in it. In the *Risāla* as well as in another tract *Fī dhikr al-kutub allatī lam yadhkurhā Djālīnūs fī Fihrist kutubih* he makes some statements about the spuriousness of several writings ascribed to Galen, and it is remarkable to see how his judgement coincides with the results of modern scholarship. Only the question of the commentary on the Hippocratic oath remains doubtful: Ḥunayn regarded it as genuine, but we have nowadays to rely on a few Arabic fragments, whereas Ḥunayn had the full text before him.

In the *Risāla* he also gives some occasional remarks on his philological methods. They are not different from ours: he used to collect as many Greek manuscripts as possible and to collate them in order to get a sound textual basis for the translation. In search of manuscripts he travelled to Syria, Palestine and even to Egypt. But in one respect his philological principles deviate from the modern. Like other Christian translators he felt the obligation to eliminate all traces of paganism from the works of the ancients, *e.g.*, to replace the pagan gods by the one God and His angels, etc. Usually this did not impair the scientific value of his translations, but it did some harm to the rich mythological material found in the dream-book of Artemidorus.

The *Risāla* also contains valuable data on the translations of Galen made by Ḥunayn's predecessors and contemporaries. He does not spare them harsh criticism, if necessary, and he often had to revise their Syriac or Arabic versions. He himself translated either into Syriac for his Christian colleagues or into Arabic for the Muslim sponsors of his work. It is remarkable that there is no word about the famous *bayt al-ḥikma*; the whole activity seems to have been based on a kind of private enterprise. He engaged two members of his family, his son Isḥāḳ, his nephew Ḥubaysh b. al-Ḥasan al-Aʿsam, and another pupil, ʿĪsā b. Yaḥyā, who also took part in translating Galen. Since Ḥubaysh and ʿĪsā did not understand Greek well enough, they made Syriac translations after Ḥunayn's Arabic or, much more often, Arabic translations after Ḥunayn's Syriac. This could lead to some deterioration, if Ḥunayn or Isḥāḳ did not have the opportunity to compare these new versions with the Greek original. Usually the colophons in the manuscripts of these second-hand versions mention Ḥunayn as the only translator, a fact which is already stated in the *Fihrist*. The reason for this is not clear. Perhaps it is due to the modesty of the pupils themselves, or else they wanted to conceal the circumstance of the double translation, as Muslim intellectuals had been well aware of its shortcomings.

Unfortunately, there exists no corresponding *risāla* for the non-Galenic writings, and it remains to be proved by an analysis

of the language and by possible mistakes resulting from ambiguities of Syriac words, whether the present Arabic versions were made by Ḥunayn directly from the Greek or by someone else after his Syriac translation. Nearly all of these Syriac versions are now lost.

Ḥunayn's own works

Besides his translations Ḥunayn composed numerous original works, mainly on medical, but also on philosophical, geophysical, meteorological, zoological, linguistic, and religious subjects. He is even credited with a history of the world from Adam down to al-Mutawakkil. His medical treatises are mainly epitomes and rearrangements of classical material. Many of them are written in the form of questions and answers, this curious kind of literature being very common also in the biblical exegesis of the Nestorian church at this time. His main work in this field is *al-Masā'il fi 'l-ṭibb* (numerous mss.), later translated into Hebrew and Latin. There also exists a so-called *Isagoge Johannitii ad parvam artem Galeni* (many Latin mss. and early printed texts). According to M. Steinschneider this is another recension of the same work.

(G. Strohmaier)

Galen

Galen (Ar. Ḏjālīnūs) was born in Pergamon, in Asia Minor A.D. 129, died in Rome about 199; he was the last great medical writer in Greek antiquity, outstanding as an anatomist and physiologist as well as a practising physician, surgeon and pharmacologist. He also became known as an influential though minor philosopher. More than 120 books ascribed to him are included in the last complete edition of his Greek works by C.E. Kühn (Leipzig 1821–33); they represent by no means his whole output: some works have survived in Arabic, Hebrew or Latin translation only, others are unretrievably lost.

Although Ḏjālīnūs stands nowhere in the first rank, his popularity especially as a physician grew steadily in subsequent centuries, and he eventually became the most influential teacher of medicine together with Hippocrates (Buḳrāṭ) whom he had helped to establish as a model physician and a pattern of perfection, and whose treatises he had explained in many elaborate commentaries. When the teaching of Greek philosophy and medicine was definitely made part of the Christian syllabus of learning in ± 500, the preservation of the greater part of his numerous works was assured and his supreme position established for the next millennium. Whereas the far superior works of his predecessors in Alexandria and elsewhere have perished, his codification of the great achievements of the Hellenistic physicians, whose independence of mind he still understood and taught himself, was handed on to posterity and was instrumental in establishing a fundamentally unbroken tradition of scientific medicine which never lost sight of him.

As in the case of philosophy and other sciences, Syrian and Arabic medicine follow the late Greek syllabus almost without a gap. We are not too badly informed about the Syriac translations of Ḏjālīnūs, by Sergius of Rāšʿayna (d. 536) and Job of Edessa (about 825) for instance. We have Ḥunayn b. Isḥāḳ's detailed survey of 129 major and minor works by Ḏjālīnūs translated into Syriac and/or Arabic by himself and others, he actually lists 179 Syriac and 123 Arabic versions. Ḥunayn's list is not even complete. The Arabs eventually came to possess translations of every

work of Djālīnūs still read in Greek centres of learning during the 7th, 8th and 9th centuries A.D., and thus knew a number of medical and philosophical works of Djālīnūs which disappeared in the late Byzantine period.

There can be no doubt—although details have still to be ascertained and interpreted in monographs—that Galen's medical works in their entirety, his methods and his results, were fully digested and appreciated by all the later Arabic physicians and became an integral part of their medical learning, in their original form as well as in summaries, commentaries and new works based on them. This by no means applies only to such outstanding physicians as Muḥammad b. Zakariya al-Rāzi or Ibn Sīnā but to many others as well. A comparison between Djālīnūs and Ibn Sīnā's *Ḳānūn fi 'l-ṭibb* would yield very interesting results indeed. Djālīnūs deserves a major chapter in any future history of Arabic medicine down to the first half of the 20th century. The Galen studies in medieval and Renaissance Europe owe very much to the Arab precedent and to Galen-translations from the Arabic.

(R. Walzer)

Hippocrates

Hippocrates (Ar. Buḳrāṭ), the most famous physician of antiquity, was born *ca.* 460 B.C. on the island of Cos, and died *ca.* 375 in Larissa (Thessaly). He sprang from the Asclepiads, an old native family of physicians, where the name Hippocrates occurred repeatedly. Already in antiquity he was considered an exceptional and model physician. This prestige was due to Galen in the first place, who brought to its culmination the "Hippocrates-revival" which had started in the 2nd century A.D. and thus determined the image of Hippocrates for the whole period to come; in Islam as in Europe, Hippocrates became the symbol of "the true physician". It is the more astonishing that hardly any of the many writings transmitted under his name can be traced back to him with full certainty. Dependent on the classification, the size of this "Corpus Hippocraticum" varies, but it comprises at least 60 writings. To the Arabs Hippocrates was well-known; his name appears as Buḳrāṭ, with suppression of the Greek ending like in Suḳrāṭ (Socrates) and Dīmuḳrāṭ (Demokritos), and also as Ibuḳrāṭ and Abuḳrāṭ. The forms Ibuḳrāṭīs, Abuḳrāṭīs, etc. are older; Syriac influence is still present in Hīfūḳrāṭīs, Īfūḳrāṭīs.

There is no lack of biographical information about Buḳrāṭ among the Arabs; the longest section is found in Ibn Abī Uṣaybiʿa, *ʿUyūn al-anbāʾ*. Buḳrāṭ's teachers are mentioned here, his father Īraḳlīdis (Heracleides) and his grandfather Buḳrāṭ; besides his father, the ancient sources name also others, like Herodicos of Selymbria. He is said to have lived up to the age of 95. The Arab biographers, to be sure, often present misleading information, e.g. Ibn Abī Uṣaybiʿa says that Buḳrāṭ was trained on Rhodes, Cnidos and Cos, while Ibn al-Ḳifṭī makes him stay for a while in Fīrūhā (i.e. Βέροια = Aleppo, in the text identified with Ḥimṣ) and Damascus; both pieces of information perhaps mean no more than that Buḳrāṭ travelled far and wide, as was already known in antiquity. On the other hand, one may assume that the Arabs retained scattered biographical data which are not found elsewhere. They were also right in stating that the Corpus Hippocratium does not go back to one single author and that there have been several physicians of this name: the mathematician

Thābit b. Ḳurra names four *Baḳāriṭa* or *Buḳraṭūn* ("Hippocraticians", one might say), the first of whom (in fact the second) would have been the famous Buḳrāṭ. The Arabs also knew about the unconfirmed statement of Galen according to which Hippocrates declined a lucrative offer of Artaxerxes I to come to the Persian court. Again and again he is commended for his care of the sick and his personal devotion; he allegedly was the first to found a hospital. Evidently, the "Hippocratic oath" was also known to the Muslims, naturally in a somewhat different form; it can be found in Ibn Abī Uṣaybiʿa. But Buḳrāṭ was admired not only as the great physician but also as the master of alchemy, astrology and magic; as such he gave his name to the handbook of Hellenistic magic which has become famous and notorious under the name *Picatrix* (distorted from *Biḳrāṭīs* "Hippocrates").

It is impossible to say to what extent the Arabic cannon of Hippocratic writings coincides with the Greek one. We would probably have more accurate information if had come down to us Galen's work, now lost, Περὶ τῶν γνησίων καὶ νόθων Ἱπποκράτους συγγραμμάτων, which existed in Isḥāḳ b. Ḥunayn's translation as *Kitāb fī kutub Buḳrāṭ al-ṣaḥīḥa wa-ghayr al-ṣaḥīḥa*. We know several bibliographical compilations of various sizes. The first to be mentioned is the valuable survey of the following 10 works, *ca.* 259/972, compiled by the historian al-Yaʿḳūbī: *K. al-Fuṣūl* Αφορισμοι, *K. al-Buldān wa-'l-miyāh wa-'l-ahwiya* Περὶ ἀέρων ὑδάτων τόπων, *K. Mā' al-shaʿīr* Περὶ πτισάνης, *K. Taḳdimat al-maʿrifa* Προγνωστικόν, *K. al-Djanīn* Περὶ γονῆς. Περὶ φύσιος παιδίου, *K. al-Arkān* (or: *K. Ṭabīʿat al-insān*) Περὶ φύσιος ἀνθρώπου, *K. al-Ghidhā'* Περὶ τροφῆς *K. al-Asābīʿ* Περὶ ἑβδομάδων, *K. Awdjāʿ al-nisā'*, *K. Abīdhīmiyā* Ἡπιδημίαι. This text has a specific value in so far as Yaʿḳūbī has added more or less detailed indices to six of these titles, so that their identification can be assured through comparison with texts that have been preserved.

Another canon of 10 works, all commented upon by Galen, is given by Ibn al-Nadīm, who also names the translators. They partly coincide with those given above, but instead of *K. Mā' al-shaʿīr*, *K. al-Djanīn*, *K. al-Ghidhā'*, *K. al-Asābīʿ* and *K. Awdjāʿ al-nisā'*, we find here: *K. al-ʿAhd* Ὅρκος, *K. al-Amrāḍ al-ḥādda* Περὶ διαίτης ὀξέων *K. al-Kasr* Περὶ ἀγμῶν, *K. al-Akhlāṭ* Περὶ χυμῶν and *K. Ḳāṭāṭiyūn* (read: *Kāṭyaṭriyūn*) Κατ' ἰητρεῖον. Barhebraeus names 9 Hippocratical works, all of which appear in both of the inventories given above, while there is added the K. *Shidjādj al-ra's* Περὶ τῶν ἐν κεφαλῇ τρωμά-των.

The by far most detailed classification is found in Ibn Abī Uṣaybiʿa; a corpus of *ca.* 61 titles, thus nearly the same number as in the Greek list. Around 30 of them are considered authentic by Ibn Abī Uṣaybiʿa. However, only 12 of these are marked as important; they are found in the lists given so far. From the indications given on the title-pages and colophons of the manuscripts as well as in the lists of titles, it cannot always be established with certainty who were the Arabic translators of the works. In any case, Ḥunayn b. Isḥāḳ and his school were at the head. But there is no inventory of translations from Hippocrates's works drawn up by Ḥunayn himself, as is the case for his translations from Galen's writings. Buḳrāṭ is extremely frequently quoted by the Arab physicians.

(A. Dietrich)

Yūḥannā b. Sarābiyūn

Yūḥannā b. Sarābiyūn was a Christian (Nestorian) physician of the 3rd/9th century. He wrote in Syriac a medical compendium (*kunnāsh*) in two different forms, one with seven, the other with twelve *maḳālāt*.

According to Ibn Abī Uṣaybiʿa, the first compendium, called the small one (*al-kunnāsh al-ṣaghīr*), was translated into Arabic by the secretary Mūsā b. Ibrāhīm al-Ḥadīthī on behalf of the physician Abu 'l-Ḥasan b. Nafīs. This translation is said to have been superior, stylistically speaking, to that of Abū Bishr Mattā b. Yūnus al-Ḳunnāʾī (d. 328/940) and to that of the well-known annotator Ḥasan b. Bahlūl al-Awānī. This *kunnāsh* was translated by Gerhard of Cremona under the title *Practica Joannis Serapionis aliter breviarium nuncupata*; in later times this translation was often reprinted. The Latin translation led to a Hebrew one by Mōshē b. Mazliaḥ. In this way, the structure and the contents of the work became known rather early. The seven treatises deal with: 1) diseases of body and nerves; 2) diseases of eye, mouth, lungs, breast and heart; 3) diseases of stomach, intestines, and those caused by worms; 4) diseases of liver, spleen, kidneys, bladder, gout; 5) skin-diseases, wounds caused by a bite, gynaecological diseases; 6) fever; 7) composite medicines (*aḳrābādhīn*).

According to the critical al-Maūsī who, in the preface to his main work, the *Kāmil al-ṣināʿa al-ṭibbiyya*, reviews the achievements of his predecessors, not many positive elements are to be found in Yūḥannā's work: e.g., he finds fault with the latter for limiting therapy to medicaments and diets, while disregarding "manual treatment" (surgery); furthermore, there are allegedly many complaints about omissions, deficiencies and inaccuracies.

(A. Dietrich)

Ḳusṭā b. Lāḳū al-Baʿlabakkī

Ḳusṭā b. Lāḳū al-Baʿlabakkī was a mediaeval scientist and translator. He was of Christian origin, from the town of Baʿlabakk. In Baghdād, where he worked for some time as a doctor, scientist and translator, his reputation was as high as that of Ḥunayn b. Isḥāḳ. He was fluent in Greek, Syriac and Arabic, being particularly noted for his excellent style in Arabic. The last part of his life was spent in Armenia, where he was induced to take up residence by the prince Sanḥarīb. According to ʿUbayd Allāh b. Djibrāʾīl, he came into contact with a certain Abu 'l-Ghiṭrīf Baṭrīḳ, for whom he composed a number of scholarly works. Ḳusṭā died in Armenia *ca.* 300/912–13; a shrine was erected over his grave, which was accorded the same honours as the graves of kings and other eminent personages.

It was, of course, usual for Arabic scholars to be well versed in a wide range of subjects, and Ḳusṭā was no exception. He is said to have been skilled in medicine, philosophy, geometry, arithmetic, astronomy, and music—all these subjects are included in the lists of his works given by the biographers. Ibn Nadīm, having first stated specifically that he has excluded translations, lists over thirty of Ḳusṭā's original works, and Ibn Abī Uṣaybiʿa adds a further thirty works to this list. Medical works, which preponderate, include the following treatises: on gout; infectious diseases; insomnia; knowledge of fevers, types of crises in illnesses, the pulse; paralysis-types, causes and treatment; the four "humours"; and phlebotomy.

No comprehensive study of Ḳusṭā's works has yet been undertaken, nor has there been made any detailed evaluation of his contribution, certainly a significant one, to the progress of science. His services as a translator must surely rank at

least equally with his original works. The biographers are unanimous in praising his skill as a translator of Greek works into Arabic, and in the light of the surviving translations their esteem seems to be fully justified.

(D. Hill)

Abū Bakr al-Rāzī

Abū Bakr Muḥammad b. Zakariyyāʾ al-Rāzī known to the Latins as Rhazes (ca.250/854–313/925 or 323/935), al-Rāzī was a physician, philosopher and alchemist.

The most free-thinking of the major philosophers of Islam, al-Rāzī was born in Rayy, where he was well trained in the Greek sciences. He was reputedly well versed in musical theory and performance before becoming a physician. His work in alchemy takes a new, more empirical and naturalistic approach than that of the Greeks or Djābir, and he brought the same empirical spirit to medicine. Immersed in the Galenic tradition, and apparently even conversant with Greek (al-Bīrūnī ascribes to him translations and abridgements from the Greek and even a poem "in the Greek language"), al-Rāzī greatly profited from the Arabic translations of Greek medical and philosophical texts. He headed the hospital of Rayy before assuming the corresponding post in Baghdād. His property in the vicinity seems to have brought him back often to Rayy, and he died there, somewhat embittered and alienated, partly by the loss of his eyesight. Like many of the great physicians of Islam, al-Rāzī was a courtier as well as a scholar, clinician and teacher. His medical handbook the *Manṣūrī*, translated into Latin by Gerard of Cremona in the 12th century, was dedicated to Manṣūr b. Isḥāḳ, the Sāmānid governor of Rayy; his *Mulūkī* or *Regius*, to ʿAlī b. Wāhsūdhān of Ṭabaristān. The author of some two hundred books, al-Rāzī claims in his apologia, the *Sīra al-falsafiyya*, or "Philosophical Way of Life", that his has been a life of moderation, excessive only in his devotion to learning; he associated with princes never as a man at arms or an officer of state but always, and only, as a physician and a friend. He was constantly writing. In one year, he urges, he wrote over twenty thousand pages, "in a hand like an amulet maker's." Others remark on his generosity and compassion, seeing that the poor among his patients were properly fed and given adequate nursing care. Arriving patients first saw an outer circle of disciples, and then an inner circle, if these could not aid them, leaving al-Rāzī himself to treat the hardest cases. His medical research was similarly methodical, as revealed in his notebooks. These were edited, in some 25 volumes, as the *K. al-Ḥāwī fi 'l-ṭibb*, at the instance of Ibn ʿAmīd, the vizier of Rukn al-Dawla. Translated as the *Continens* in 1279 by the Jewish physician Faradj b. Sālim (known as Farraguth) for King Charles of Anjou, it was printed at Brescia in 1486 and repeatedly thereafter. The text contains al-Rāzī's extensive notes from a wide range of sources, organised anatomically, from head to toe. His own clinical observations, often at variance with received opinions, typically close the sections. Al-Rāzī mined these files for his numerous medical works, and several unfinished works can be discerned in the *Ḥāwī* in embryo. His magnum opus, the *Kitāb al-Djāmiʿ al-kabīr*, or "Great Medical Compendium", often confused with the *Ḥāwī*, was a work that al-Rāzī published, not the corpus of his private files. Among the most famous of his medical writings are those on *Stones*

in the kidney and bladder (*K. al-Ḥaṣā fi 'l-kulā wa 'l-math̲āna*) and *Smallpox and measles* (*K. al-D̲jadarī wa 'l-ḥaṣba*). The latter was the first book on smallpox, and was translated over a dozen times into Latin and other European languages. Its lack of dogmatism and its Hippocratic reliance on clinical observation typify al-Rāzī's medical methods. His independent mind is strikingly revealed in his *Sh̲ukūk ʿalā D̲jalīnūs* or "Doubts about Galen". Here al-Rāzī rejects claims of Galen's, from the alleged superiority of the Greek language to many of his cosmological and medical views. He places medicine within philosophy, inferring that sound practice demands independent thinking. His own clinical records, he reports, do not confirm Galen's descriptions of the course of a fever. And in some cases he finds that his clinical experience exceeds Galen's. He rejects the notion, central to the theory of humours, that the body is warmed or cooled only by warmer or cooler bodies; for a warm drink may heat the body to a degree much hotter than its own. Thus the drink must trigger a response rather than simply communicating its own warmth or coldness. This line of criticism has the potential, in time, to bring down the whole theory of humours and the scheme of the four elements, on which it was grounded. Al-Rāzī's alchemy, like his medical thinking, struggles within the cocoon of hylomorphism. It dismisses the idea of potions and dispenses with an appeal to magic, if magic means reliance on symbols as causes. But al-Rāzī does not reject the idea that there are wonders in the sense of unexplained phenomena in nature. His alchemical stockroom, accordingly, is enriched with the products of Persian mining and manufacture, and the Chinese discovery, sal ammoniac. Still reliant on the idea of dominant forms or essences and thus on the Neoplatonic conception of causality as inherently intellectual rather than mechanical, al-Rāzī's alchemy nonetheless brings to the fore such empiric qualities as salinity and inflammability—the latter ascribed to "oiliness" and "sulphuriousness". Such properties are not readily explained by the traditional fire, water, earth and air schematism, as Gh̲azālī and other later comers, primed by thoughts like al-Rāzī's, were quick to note.

Like Galen, al-Rāzī was speculatively interested in the art and profession of medicine. He wrote essays on such subjects as "The reasons for people's preference of inferior physicians," "A mistaken view of the function of the physician," "Why some people leave a physician if he is intelligent," "That an intelligent physician cannot heal all diseases, since that is not possible," and "Why ignorant physicians, common folk, and women in the cities are more successful than scientists in treating certain diseases—and the physician's excuse for this." He also shared Galen's interest in philosophy and heeded his treatise, "That the outstanding physician must also be a philosopher." Al-Bīrūnī lists some eighty philosophical titles in his al-Rāzī bibliography, and Nadīm lists dozens of his works on logic, cosmology, theology, mathematics and alchemy. Given the general repugnance toward al-Rāzī's philosophical ideas among his contemporaries and medieval successors, few of these works were copied. But fragments survive in quotations by later authors, as do the *Sīra al-falsafiyya* and the *Ṭibb al-rūḥānī*, the "Spiritual physick" or "Psychological medicine," which embodies al-Rāzī's largely Epicurean ethical system. Among the writings of which we have mention are: a commentary on Plato's *Timaeus*, perhaps based on the epitome of Galen, a rebuttal of Iamblichus' response to Porphyry's *Letter to Anebos* (that is, the

De mysteriis), an appraisal of the Ḳurʾān, a critique of Muʿtazilism, another on the infallible Ismāʿīlī Imām, a work on how to measure intelligence, an introduction to and vindication of algebra, a defence of the incorporeality of the soul, a debate with a Manichaean, and an explanation of the difficulty people have in accepting the sphericity of the earth when they are not trained in rigorous demonstration. Other works deal with eros, coitus, nudity and clothing, the fatal effects of the Simoom (or simply, of poisons, *sumūm*) on animal life, the seasons of autumn and spring, the wisdom of the Creator, and the reason for the creation of savage beasts and reptiles. One work defends the proposition that God does not interfere with the actions of other agents. Another rebuts the claim that the earth revolves. Al-Rāzī discussed the innate or intrinsic character of motion, a sensitive point at the juncture between Democritean and Aristotelian physics. He wrote several treatments of the nature of matter, and one on the unseen causes of motion.

The *Ṭibb al-rūḥānī*, written for Manṣūr as a companion to the *Manṣūrī*, develops a moderately ascetic ideal of life from the premise that all pleasures presuppose a prior pain (or dislocation). This means that peace of mind or lack of perturbation is the optimum of pleasure, as al-Rāzī explains in his widely-cited lost work on pleasure. Pleasures cannot be amassed or hoarded, and what some hedonists might think of as "peak experiences" are reached only by traversing a corresponding valley. To feed an appetite, moreover, is only to enlarge it. So the attempt to maximise one's happiness by serving the appetites and passions is a self-defeating strategy, as Plato showed when he argued that such a life is comparable to trying to carry water in a sieve. Epicurus took that argument very much to heart when he sought to devise a hedonistic alternative to the sybaritic outlook of the Cyrenaic philosophers, and al-Rāzī does so as well. His ethical treatise follows al-Kindī's precedent in treating ethics as a kind of psychic medicine or clinical psychology, an approach later used by Ibn Gabirol and Maimonides. But the basis of the art in question, which is the Socratic tendance of the soul, is not primarily the Platonic "second voyage," the endeavour to flee to a higher world—although that theme is important to al-Rāzī. Expressing grave doubts about the demonstrability of immortality, he falls back on the less metaphysically demanding and more dialectically persuasive position that, if death is the ultimate end of our existence, it is nothing to be feared but only a surcease of our pains and troubles.

Wisdom, then, springs not from the thought of death, as many philosophers and pious teachers have supposed, but from overcoming that thought. For, even more than the appetites themselves, the fear of death is the goad of the passions that hamper human rationality and undermine human happiness. As al-Rāzī explains: "As long as the fear of death persists, one will incline away from reason and toward passion (*hawāʾ*)." The argument is Epicurean. The passions here, as in Epicurus, are thought of as neuroses, compulsions, pleasureless addictions, to use al-Rāzī's description (his word for an addict is *mudmin*). The glutton, the miser, even the sexual obsessive, are, by al-Rāzī's analysis, as much moved by the fear of death as by natural appetites. For natural needs, as Epicurus would explain, are always in measure. The unwholesome excess that makes vice a disease comes from the irrational and unselfconscious mental linking of natural pleasures and gratifications with security, that is, a sense of freedom from the fear of death.

Ethics here becomes entirely prudential, as al-Rāzī's critics were not slow to note. If we knew that our ultimate state was immortality, and the return of the soul in us to her true home, our mad scrabbling after the surrogates of immortality would cease. But the fear of death "can never be banished altogether from the soul, unless one is certain that after death it shifts to a better state." And his conclusion is that it "would require very lengthy argumentation, if one sought proof rather than just allegations (*khabar*). There really is no method whatever for argument to adopt on this topic… The subject is too elevated and too broad as well as too long.… It would require examination of all faiths and rites that hold or imply beliefs about an afterlife and a verdict as to which are true and which are false"—a task al-Rāzī has no immediate or pressing intention of attempting. For practical purposes, then, he offers the Epicurean consolation that death is nothing to us, if the soul is really mortal. What scripture has to say on the subject is just another undemonstrated report, an unsubstantiated allegation.

(L.E. Goodman)

Pharmacology

Al-Ṣaydana (or *al-Ṣaydala*) (Ar.) is pharmacology, in the meaning of pharmacognosy. The druggist is called *al-ṣaydalānī* or *al-ṣaydanānī*. Al-Bīrūnī defines him as follows: "He is someone who occupies himself with gathering medicaments according to their most commendable sorts and with selecting their best kinds, both simple ones and those which have been prepared according to the most excellent compositions, which have definitely been determined for that purpose by medical authors". Elsewhere he says "*al-ṣaydana* therefore is the knowledge of simple drugs according to their selected sorts, kinds and forms, as well as the knowledge of the mixture of medicaments composed in conformity with their written prescriptions or on the basis of what the trustworthy and righteous researcher strives for. The highest rank, however, is held by the knowledge of the effects of the simple medicaments and their specific qualities". Besides, *ṣaydana* indicates the druggist's actual store of drugs, and also (with or without a preceding *kitāb*) the handbook of drugs, the pharmacopeia. *Al-ṣaydalānī* is practically synonymous with *al-ʿaṭṭār*. Since healing powers are ascribed to many perfumes, both terms indicate also the merchant of spices and aromas.

The classical definition of pharmacology is found in al-Bīrūnī's highly important Preface to his unfinished *K. al- Ṣaydana* [*fi 'l-ṭibb*], written in his old age. He classifies *al-ṣaydana* as a sub-discipline in the field of medicine. According to him, it is the first of the stages of the medical art and for many it counts only as the latter's preliminary stage because it is a tool for practising medicine, not a part of it. As far as the word *ṣaydana* is concerned, al-Bīrūnī first refers to the well-known fact that the Arabic *ṣād* corresponds with Indo-Iranian *čīm*. He approvingly quotes Ḥamza al-Iṣfahānī, who is said to have explained *ṣaydanānī* as an Arabisation of *čandanānī* "merchant of sandalwood". Sandalwood is not a medicinal plant *par excellence*, but one may assume—al-Bīrūnī continues—that the Persians, when looking for sandalwood, came in contact with the Indians and called their merchant of perfume *čandanānī*. The Arabs would then have taken over this term, and Arabised it because they did not know a name for it. And since sandalwood was not counted among their perfumes, and since they were hardly able to distinguish between a

perfume merchant and a drug merchant, they identified the two words. There exist, therefore, in this case the same transitions of meaning as those found in the case of *ʿaṭṭār*. The second consonant of *č/ṣandanānī*, the *nūn*, would then have been miswritten or misread into *yāʾ*. The fact that the word *ṣaydala/ṣaydalānī*, as far as is known to the writer of these lines, is completely unknown in the western Muslim world, may be explained from its Indian origin; in the West, the corresponding terms are [*ʿilm*] *al-adwiya al-mufrada* or *al-murakkaba*, in quotations often abbreviated to *al-adwiya* or [*ʿilm*] *al-ʿuṭūr/al-ʿaṭṭār* (see above).

As an oriental synonym of *al-ṣaydalānī*, al-Bīrūnī also mentions *al-dārī*, with which the Arabs in the old days indicated the perfume merchant, because the ships from India brought their goods to the port of Dārīn, lying in the area of Baḥrayn. Al-Bīrūnī substantiates the meaning of the word with examples taken from ancient Arab poetry.

(A. Dietrich)

Dioscorides

Diyusḳuridīs is the most correct Arabic transcription of the Greek Διοσκορίδης; other forms, such as Diyāsḳūridūs, allow a certain Syriac influence to be admitted. In Islam the name always refers to Pedanius Dioscorides (Ist. century B.C.), born at Anazarbe in Cilicia, whose name when fully arabicized is Diyusḳuridīs ʿAyn Zarbī. After Galen (Ḏjālīnūs) (377/987), he is the doctor most frequently quoted by Muslims. His περί ὕλη ἰατρικής, which was already considered by Galen to be a definitive manual of *materia medica* and which has been the foundation of Muslim pharmacology is known in Arabic by different names: *Hayūlā ʿilāḏj al-ṭibb*, *Kitāb al-adwiya al-mufrada* and *Kitāb al-ḥashāʾish*. It was an original translation from Greek into Syriac which provided the basis for the Arabic version; this was made by Iṣṭifān b. Basīl, with the original text before him, and corrected by Ḥunayn b. Isḥāḳ in Baghdād in the 3rd/9th century; it was the only complete translation made in the Muslim world. This translation, like the earlier Greek text, was issued in two versions: 1) the original edition of Dioscorides, which arranged simple drugs systematically in groups, divided the work into five books; to these were added up to three later apocryphal books on poisons.—2) for ease of reference, alphabetical order was introduced, an arrangement which lent itself to expansion of the text.

The Arabic text of Dioscorides was disseminated *in extenso* or in fragments throughout the whole Muslim world and has helped later pharmacological studies in the Arabic language. Two great difficulties have been evident from the start: the first a question of natural history, from the fact that botanical species were not the same everywhere; the second, a linguistic and lexical difficulty, for it was not easy to name the different species without ambiguity. The original Arabic translation acknowledges these difficulties by introducing into the text the original Greek, Syriac and Iranian names.

For this reason, the marginal glosses are of the highest importance for the manuscripts of the *materia medica* of Dioscorides. One of the most precious, the codex copied at the imperial court of Byzantium for princess Anicia Juliana, is of great interest on account of the variety of its glosses which bear witness to the hazardous progress from East to West of Greek as well as Arabic manuscripts, giving proof of the continuous scholarly work which they have inspired. During the 4th/10th cen-

tury the centre of this ceaseless labour was the caliphal court at Cordova where the monk Nicholas who had come from Constantinople, in collaboration with Ḥasdāy b. Shaprūṭ and others, adapted the old eastern Arabic version to the needs of western Hispano-Arabic nomenclature, a task which was continued by Ibn Djuldjul, Ibn Buklārish and others. A similar readaptation was carried out in the East by Ḥusayn b. Ibrāhīm al-Natūlī who dedicated his Arabic Dioscorides in 380/990–91 to prince Abū ʿAlī al-Samdjūrī of Ṭabaristān. Now, if Arabic pharmacology reached its apogee in al-Andalus with al-Ghāfiḳī and Ibn al-Bayṭar, not only was use made of fragments of the text of Dioscorides, but also Ibn al-Bayṭār (7th/13th century) himself edited a *Tafsīr Kītāb Diyusḳuridīs*, a manuscript of which, with its glosses, is preserved at Mecca. Later the polygraph Abu 'l-Faradj—Bar Hebraeus (7th/13th century) wrote a résumé in Syriac entitled *Kethabha dhe Dhiosḳoridhus*. On the whole, the work of Dioscorides was known above all in the fragmentary form preserved by Ibn al-Wāfid, Māsawayh and others. Latin versions which for the most part were made in Toledo allowed mediaeval Europe to become acquainted, through the medium of two translations, with only part of his work; and the complete text of Dioscorides only became known in the West at the Renaissance. But fragments of the Arabic Dioscorides were also translated in the East, as is proved by the Armenian pharmacology of Amīr Dawlat (2nd half of the 15th century).

Any study of the *materia medica* of Dioscorides is incomplete if his iconography is omitted. Dioscorides himself used botanical drawings by Cratevas (1st century B.C.), whose sketches are preserved in Greek and Arabic manuscripts. In their illustrations these manuscripts contain an additional element which may help to determine their origins. As for the iconography, in addition to the ancient source already mentioned, it sometimes reveals Byzantine traces, and at other times Iranian influence; by the nature of things the different Muslims schools of painting are reflected, as for example the Baghdād school or the later Persian schools. Particularly interesting as a Muslim botanist and one of the most original is Ibn al-Sūrī (d. 639/1241), who when botanizing in Syria took with him an artist who made drawings of plants for him at different stages of growth; it is astonishing that Ibn al-Bayṭār does not quote this author who was his contemporary. In the iconography of the Arabic Dioscorides we have a proof that Diyusḳuridīs became the point of fusion of all the earlier traditions, enriched by the Muslims' observations of nature.

(C.E. Dubler)

Ibn al-Bayṭār

Abū Muḥammad ʿAbd Allāh b. Aḥmad al-Dīn b. al-Bayṭār al-Mālaḳī Ibn al-Bayṭār was a botanist and pharmacologist, born in Malaga at the end of the 6th/12th century. He probably belonged to the family of the same name whose existence in Malaga is attested by Ibn al-Abbār. He studied in Seville and collected plants in the districts round the town with his teachers Abu 'l-ʿAbbās al-Nabātī, ʿAbd Allāh b. Ṣāliḥ and Abu 'l-Ḥadjdjādj. In about 617/1220 he emigrated to the East: after crossing North Africa (Morocco, Algeria and Tunisia), he visited Asia Minor and Syria and, on his arrival in Egypt, he was appointed by the Ayyūbid al-Malik al-Kāmil as head of the herbalists (*raʾīs ʿalā sāʾir al-ʿashshābīn*). From Cairo he made several scientific expeditions; he next settled in Damascus,

where his pupil was Ibn Abī Uṣaybiʿa, with whom he collected plants. He died here in 646/1248.

His main works are: (1) *al-Mughnī fi 'l-aḏwiya al-mufrada*, dedicated to al-Malik al-Ṣāliḥ Nadjm al-Dīn Ayyūb, in which he gives the appropriate simples for each illness. (2) *al-Djāmiʿ li-mufradāt al-adwiya wa 'l-aghdhiya*, with the same dedication. In this work the author lists in alphabetical order some 1400 simples, animal, vegetable and mineral, basing it on his own observations and also on over 150 authorities including al-Rāzī, Ibn Sīnā, al-Idrīsī and al-Ghāfiḳī. Meyerhof and Sobhy consider that the *Djāmiʿ* of Ibn al-Bayṭār is merely plagiarized from the pharmacopoeia of al-Ghāfiḳī with the addition of material obtained from the works of his teachers. Apart from this doubtful statement (particularly since the mediaeval idea of intellectual honesty was different from that of today), it should be mentioned that, of the total number of simples studied, about a thousand were already known to Greek authors. This work had a considerable influence both outside and within the Islamic world, for example on the Armenian Amir Dowlat. (3) *Mīzān al-ṭabīb*. (4) *Risāla fi 'l-aghdhiya wa 'l-adwiya*. (5) *Maḳāla fi 'l-līmūn*. (6) Commentary on Dioscorides, of which a manuscript has been found and which contains a list of 550 drugs which appear in the first four books of Dioscorides; the technical terms are frequently accompanied by their Latin and Berber equivalents.

(J. Vernet)

Medicaments

(Ar. *adwiya*, pl. of *dawāʾ*) every substance which may affect the constitution of the human body, every drug used as a remedy or a poison. In accordance with Greek ideas, Muslim pharmacologists distinguished between simple drugs, *adwiya mufrada* (φάρμακα ἁπλᾶ and compound drugs, *adwiya murakkaba* (φ. σύνθετα). According to their origin, the *adwiya* were divided into vegetable (*nabātiyya*), animal (*ḥayawāniyya*) and mineral (*maʿdiniyya*).

Like medicine in general, Muslim pharmacology depends on Greek learning. An element of Persian tradition is also revealed in the pharmacological nomenclature. In many cases these Persian names of plants and drugs, some of them still in use may date from the time of the celebrated medical school of Djundīsābūr, where Greek science flourished on Persian soil. This learning began to exercise an effective influence on the Muslims in the year 148/765, when the caliph Manṣūr summoned to attend him the chief physician of the hospital of Djundīsābūr, Djurdjīs of the family of Bukhtyashūʿ. Greek pharmacological learning was transmitted through Syriac translations of the fundamental works of Dioscorides, Galen, Oribasius and Paul of Aegina.

The Dioscoridean idea, clearly expressed by the great Iranian scientist al-Bīrūnī in his pharmacological work cited below, that, theoretically, every plant had some medicinal virtue, whether actually known or not, caused pharmacological writers to include in their works plant descriptions which had a purely botanical interest, derived especially from Abū Ḥanīfa al-Dīnawarī. There is thus in Muslim tradition no clear difference between *materia medica*, or works on *al-Adwiya al-Mufrada* etc., and botany, *Nabāt*.

According to the autobibliographical *risāla* of Ḥunayn b. Isḥāḳ, the first five *maḳālāt* of the *Book of Simple Drugs* of Galen were translated into Syriac, rather unsatisfactorily, by Yūsuf al-Khūrī, later on by Ayyūb (Job of Edessa, about A.D.

765–835), and, finally, in an abridged form (?) by Ḥunayn himself, who also made an Arabic translation of the text; of the second part a Syriac translation made by Sergius (Sargīs of Risẖʿaynā, d. 536) was corrected by Ḥunayn and turned into Arabic by his nephew Ḥubaysẖ. (The *Book of Compound Drugs* also was translated into Syriac by Sergius and Ḥunayn, then into Arabic by Ḥubaysẖ).

The *Pragmatia* of Paul of Aegina was highly appreciated by Muslim physicians, who used an (abridged?) translation of its seven books by Ḥunayn. Apart from small fragments no manuscript survives in Arabic, but there are frequent quotations in the works of later authors.

According to Bar Hebraeus, Ahron the priest wrote his medical pandect in Greek, and his work was translated into Syriac. An Arabic translation was made by Māsardjis (Māsardjawayh). The *Kunnāsẖ* of Ahrun *al-ḳass* is often quoted by pharmacological writers, and its author had a great reputation as a scholar. Māsardjis/Māsardjawayh, the first translator of medical works into Arabic, was also the author of two books, one on food and the other on simples (*al-ʿAḳāḳīr*), perhaps identical with the two *maḳālāt* added to his translation of Ahron.

After the time of Ḥunayn, pharmacology rapidly developed in the Eastern countries of the Muslim world. About a hundred Arabic authors on *materia medica* are mentioned in the bibliographical works of Ibn Nadīm, Ibn Abī Uṣaybiʿa and Ibn al-Ḳifṭī. Some thirty are represented by manuscripts in Eastern and Western libraries. Only a few of these works have been studied by Western scholars. For the history of the Greek text of Galen etc. these Arabic texts will certainly prove to be of importance.

In the course of time, many hundreds of names of simple drugs, not known to the Greeks, were incorporated in the body of learning transmitted by the Greeks to their Arab and Persian disciples. Serious confusion in terminology inevitably followed from the great influx of names of Arabic, Iranian, Greek and Indian names of plants and drugs which were current in theory and practice. In the course of time many works were written with the purpose of determining their true significance and of putting together synonyms. For practical purposes the translation of Dioscorides made in Baghdād was of little use to readers, as long as the Greek names were for the most part only transliterated in Arabic characters. Arabic equivalents were introduced into the text by Spanish scholars in the middle of the 10th century. About the same time the Arab translator of the Syriac *Kunnāsẖā* of Yuḥannā b. Sarābiyūn (Serapion) gave Arabic equivalents to the great number of Greek and Syriac names of simples contained in that work. One of the oldest prose works written in Persian is the *al-Abniya ʿan Ḥaḳāʾiḳ al-Adwiya* of Abū Manṣūr Muwaffaḳ b. ʿAlī al-Harawī explaining, in alphabetical order, the Arabic, Persian, Syriac and Greek names of 584 different simples.

The most interesting work on pharmacological synonyms written in the East is certainly that of al-Bīrūnī (361–440/972–1048), *al-Ṣaydana fi'l-Ṭibb*. Apart from two MSS of a Persian translation, this work has come down to us in a single, mutilated MS in Brusa, representing the author's rough draft of the work, probably written in his old age and never completed by him. In its unfinished condition it contains 720 articles, in the common order of the Arabic alphabet, dealing with vegetable, animal and mineral simples with numerous remarks on their names in Greek, Syrian, Indian, Persian and other Iranian languages, philological notes on the meaning of plant names and their synonyms used

in Arabic poetry, and copious quotations from medical and botanical works (many of them quite unknown to us) on the quality and origin of the drug, its substitutes (*abdāl*) etc. This work certainly deserves further study.

Among the numerous works on medicine written in the East and containing also chapters on pharmacology only the most important can be mentioned here. The *Firdaws al-Ḥikma* of ʿAlī b. Rabban al-Ṭabarī, written in 235/850, quotes the translations of Ḥunayn and his disciples and is of special interest as aiming to introduce also Indian medicine. The large medical encyclopaedia (*al-Ḥāwī*) of Abū Bakr al-Rāzī (250–313/864–925) abounds with names of drugs. The corresponding chapter in the immense *Ḳānūn fi'l-Ṭibb* of Ibn Sīnā treats of eight hundred remedies. The 10th book of the *Dhakhīra-yi Khʷārizmshāhī*, a medical encyclopaedia written by Zayn al-Dīn Ismāʿīl al- Djurdjānī in the 6th/12th century, contains a special treatise on the names of drugs and their operation.

In very many cases the descriptions of Dioscorides, Abū Ḥanīfa al-Dīnawarī, etc., were certainly inadequate for the recognition of the plant. Thus, in the absence of technical terminology—a want shared by Muslim as well as ancient science—it was a most valuable device to depict the plants in figures. In ancient time this method was introduced by the "rhizotomist" Crateuas (1st century B.C.), and a part of the synonyms and figures of his herbal passed into the recension of Dioscorides represented by the Juliana Anicia codex of A.D. 512 (in which later hands introduced also Arabic synonyms). It was the gift of an illustrated Dioscorides by the Byzantine Emperor to ʿAbd al-Raḥmān III in Cordova in the year 948 that inspired a new and most fruitful study of the text in Spain. By Ibn Abī Uṣaybiʿa we are told that his teacher Rashīd Dīn al-Manṣur b. al-Ṣūrī (d. 639/1241) prepared a herbal illustrated with figures depicted from living plants.

The Muslim inhabitants of the Iberian Peninsula were the inheritors of a country famous in antiquity for its wealth of minerals and plants useful for preparing remedies. At first, pharmacological knowledge in Spain was, however, an import from the Orient, and Western students went to Baghdād for medical studies. A strong impulse to pharmacological studies in Spain was given by the revised text of Dioscorides, and from the end of the 10th century on there was no lack of contributions to the knowledge of simples. The first to write books on simples in Spain were ʿAbd al-Raḥmān b. Īsḥāḳ b. Haytham and Sulaymān b. Ḥassān, known as Ibn Djuldjul, both of whom joined the monk Nicolas and the other physicians and botanists who worked on the text of Dioscorides. Ibn Djuldjul wrote a work on those simples which are not mentioned by Dioscorides. The great medical encyclopaedia *al-Taṣrīf* by Abu'l-Ḳāsim Zahrāwī (d. about 400/1009) contains in its 27th book a treatise on the simples, their synonyms and substitutes. About the life of Abū Bakr Ḥāmid b. Samadjūn very little is known except that he was a prominent physician in the days of the *ḥādjib* Manṣūr (d. 392/1002). His famous *Book of Sayings of Ancient and Modern Physicians and Philosophers about the Simple Drugs* has recently come to light.

The most comprehensive textbook on simples (and botany) produced in Spain was written by al-Ghāfiḳī, probably in the first half of the 6th/12th century. An abridged version was made by the Christian Abu'l-Faradj b. ʿIbrī, commonly called Barhebraeus. The method and arrangement of materials followed by Ibn Samadjūn and al-Ghāfiḳī was the model

also of al-Idrīsī (d. 560/1166). In his *Book of Simple Drugs* he contributes a vast material of synonyms in many languages.

In a vast encyclopaedia, *al-Djāmiʿ li-Mufradāt al-Adwiya wa'l-Aghdhiya*, Ibn al-Bayṭār (d. 646/1248) put together all information available to him, quoting about 150 previous authors from Dioscorides to his own teacher, Abu'l-ʿAbbās al-Nabātī, whose *Riḥla*, or "Botanical Journey", he often quotes. Most of these works Ibn al-Bayṭār certainly knew from secondary sources, al-Ghafiḳī above all. In 2324 articles the *Djāmiʿ* treats of about 1400 different drugs and plants, 400 of which were not known to the Greeks.

To these works, written in the West, containing descriptions of the drugs and directions for their use, may be added also a number of others, containing lists of synonyms written in order to explain the meaning of the different names given to simples and drugs. Such are e.g. the *Sharḥ Asmāʾ al-ʿUḳḳār* of the famous Jewish theologian, philosopher and physician Mūsā b. Maymūn (Maimonides, A.D. 1135–1204), treating especially of the names current in Morocco and written probably in the 18th century.

(B. Lewin)

Druggist

Al-ʿAṭṭār (Ar.), like *al-ṣaydalānī*, primarily meant a perfume merchant or druggist; but as most scents (*ʿiṭr*, pl. *ʿuṭūr*) and drugs (usually *ʿaḳḳār*, pl. *ʿaḳāḳīr*) were credited with some healing properties, *ʿaṭṭār* also came to mean chemist and homoeopath (*mutaṭabbib*). His activities combine commerce with science and medicine. He has to know "the diverse drugs, curatives, drafts and scents, their good and bad varieties, as well as what is fraudulent; he must know which things change quickly or go bad, and which do not, and what means there are for their preservation or reconstitution. Finally, he must know the mixing of drafts and potions, powders and spices" (al-Dimashḳī, *Kitāb al-Ishāra ilā Maḥāsin al-Tidjāra*). Today the term also sometimes includes dyers and dye-merchants, although the perfume merchants are the noblest and wealthiest of the *ʿaṭṭārūn*. As in the Middle Ages, herbal remedies—that is to say, the greater part of the medicines offered—are still sold dry (i.e., roots and wood chopped small; herbs, leaves, and flowers whole or crushed; and fruit or seed just dried). The containers were generally provided by the bazaar druggist. The plants and animals which a druggist used, and the methods of obtaining his raw materials, are particularly vividly presented in an illuminated Persian Dioscorides-manuscript written in the year 867/1463. Medicines were usually given in simple form (*adwiya mufrada, Simplicia*), but they were sometimes compounded (*adwiya murakkaba, Composita*) by the *ʿaṭṭār* in the presence of the patient, who, if need be, was given a dose right away.

The professional knowledge of the bazaar druggist is usually scanty, and his medicines are often completely spoilt by storage under unsuitable conditions for excessive periods. Druggists have always been known for their cheating in measures and general quackery, as is attested to both by specialised works on fraudulent practices, (such as *Kitāb al-Mukhtār fī Kashf al-Asrār wa-Hatk al-Astār* of Djawbarī (7th century A.H.), which is still much read in the Orient) and by treatises on the duties of a market superviser (*muḥtasib*). M. Meyerhof reports, for instance, how French perfumes are diluted and tampered with in the bazaar, bottled in oriental flasks, and then sold to the Europeans as genuine oriental scent and to the local inhabitants as improved Parisian products.

Concerning weights, measures, and vessels used by the *ʿaṭṭārūn*, more information can be found in G. C. Miles, *Early Arabic Glass Weights and Stamps*, Supplement, New York 1951. The best known druggists' quarter (*sūḳ al-ʿaṭṭārīn*) of ancient times was in al-Fusṭāṭ, which was burned down almost completely in 563/1168 (but was, according to Ibn Duḳmāḳ, rebuilt under the Mamlūks), also referred to in documents from the Geniza. The *sūḳ al-ʿiṭr* of Damascus is also worthy of note. A woodcut in E.W. Lane, *An Account of the Manners and Customs of the Modern Egyptians* ii, facing p. 9, gives a vivid picture of a druggist's shop in the 19th century. Original bills for medicines, prescriptions, and similar texts from a druggist's practice, exist in considerable numbers on papyrus. The fact that this particular calling was very widespread is borne out by the frequency with which the term *al-ʿaṭṭār* appears as a cognomen, especially amongst poets and scholars for whom this calling may well have served as an additional source of income. The best known instance is Farīd al-Dīn ʿAṭṭār.

(A. Dietrich)

Pharmacopoeia

Ar. *aḳrābādhīn*, or *ḳarābādhīn* from Syriac *grāfādhīn*, reproducing Greek γραφίδιον, "small treatise", was used by the Arabs as a title of treatises on the composition of drugs, or pharmacopoeias, while the simples which went into the composition were designed by the term *al-adwiya al-mufrada*.

The practice of pharmacology

In the hospitals pharmacological instruction very early made an important part of the medical training. That the big hospitals had a pharmacist on the staff we can infer e.g. from the *al-Ṣaydala fi 'l-Ṭibb* of al-Bīrūnī. The rapid increase in the *materia medica*, not only of Greek but also of Iranian and Indian origin certainly called for a special body of men and for the separation of the pharmaceutical from the medical profession. In ordinary outside practice the doctor may have prescribed and compounded his own mixtures. As a rule drugs were bought separately from the druggist and then compounded. The *muḥtasib* had to give heed to the various ways in which drugs were adulterated. The practice of preparing substitutes for certain simple drugs is attested by the philosopher al-Kindī who wrote a treatise containing recipes for the preparation of substitutes for rare drugs.

Pharmacological literature

Galen's *De medicamentorum compositione secundum locos et genera* had been translated into Arabic, under the title *Kitāb Tarkīb al-Adwiya*, by Ḥubaysh from the Syriac of Ḥunayn b. Isḥāḳ. We are told that surgeons, before they could practise, were obliged to make themselves masters of this work.

The first pharmacopoeia to receive universal acceptance throughout the caliphate was written by the Christian physician Sābūr b. Sahl (d. 255/869), of the staff of the hospital of Djunday Sābūr. According to Ibn Nadīm it contained 22 chapters, according to Ibn Abī Uṣaybiʿa 17 chapters. It was in common use until the publication of the *Aḳrābādhīn* of Amīn al-Dawla Hibat Allāh b. Saʿīd b. al-Tilmīdh (d. 560/1165). Ibn al-Tilmīdh was a court physician to al-Muḳtafī and to his successor al-Mustandjid and attached to the ʿAḍudī hospital in Baghdād. Besides the *Aḳrābādhīn* in 20 chapters he wrote a compendium (*al-Mūdjaz al-Bīmāristānī*) for use in ordinary hospitals. Manuscripts

of these works or of parts of them have come down to us, as have also manuscripts of the *Aḳrābāḏhīn* of the famous physician and philosopher Abū Bakr Muḥammad b. Zakariyyāʾ al-Rāzī. Of the pharmacopoeias written in the East, the *Aḳrābāḏhīn* of Badr al-Dīn Muḥammad b. Bahrām al-Ḳalānisī, who wrote in the year 590/1194, is also worth mentioning. In this work, of which several manuscripts have come down to us, the author quoted the *Ḥāwī* and the *Ṭibb al-Manṣūrī* of al-Rāzī, the *Ḳānūn* of Avicenna and other works. Of the great medical compilation written by Naḏjm Dīn Maḥmūd b. Iyās Shīrāzī (d. 730/1330), the 5th part, containing a treatise on compound drugs, was edited by F.F. Guigues.

In Egypt the Jewish physician Mūsā b. al-ʿĀzār (Moses b. Eleazar) wrote an *Aḳrābāḏhīn* for the Fatimid caliph al-Muʿizz. In the hospitals of Egypt, Syria and ʿIrāḳ the *al-Dustūr al-Bīmāristānī* of Abu 'l-Faḍl b. Abi 'l-Bayān al-Isrāʾīlī was in common use until it was replaced by the *Minhāḏj al-Dukkān* of Ibn al-ʿAṭṭār al-Isrāʾīlī which was published in Kairo in 658/1260.

In Muslim Spain the study of the text of Dioscurides seems to have inspired an exclusive confidence in the simple drugs. We are informed by Ibn Abī Uṣaybiʿa that the famous physician Ibn Wāfid (d. after 460/1068) very seldom prescribed a compound drug. Like his contemporary ʿAbd Allāh b. ʿAbd al-ʿAzīz al-Bakrī, who wrote an inventory of the plants and trees of al-Andalus, Ibn Wāfid seems to have been an enthusiastic adherent of the Dioscoridean tradition in medicine. This is true also of al-Ghāfiḳī, the most important pharmacologist of Muslim Spain. In the Latin tradition the *Grabadin* of Mesue Junior (according to Leo Africanus this work was written by a certain Māsawayh al-Mārindī, who died in Baghdād in 1015, and translated into Latin by a Sicilian Jew) was for centuries the recognized authority on pharmacy throughout Europe and became the basis of later official pharmacopoeias.

(B. Lewin)

Ibn Sīnā

Abū ʿAlī al-Ḥusayn b. ʿAbd Allāh b. Sīnā, known in the West as Avicenna, followed the encyclopaedic conception of the sciences that had been traditional since the time of the Greek Sages in uniting philosophy with the study of nature and in seeing the perfection of man as lying in both knowledge and action. He was also as illustrious a physician as he was a philosopher.

Life

His life is known to us from authoritative sources. An autobiography covers his first thirty years, and the rest are documented by his disciple al-Djuzaḏjānī, who was also his secretary and his friend.

He was born in 370/980 in Afshana, his mother's home, near Bukhārā. His native language was Persian. His father, an official of the Sāmānid administration, had him very carefully educated at Bukhārā. His father and his brother were influenced by Ismāʿīlī propaganda; he was certainly acquainted with its tenets, but refused to adopt them. His intellectual independence was served by an extraordinary intelligence and memory, which allowed him to overtake his teachers at the age of fourteen.

It was he, we are told, who explained logic to his master al-Nātilī. He had no teacher in the natural sciences or in medicine; in fact, famous physicians were working under his direction when he was only sixteen. He did, however, find difficulty

in understanding Aristotle's *Metaphysics*, which he grasped only with the help of al-Fārābī's commentary. Having cured the *amīr* of Khurāsān of a severe illness, he was allowed to make use of the splendid library of the Sāmānid princes. At the age of eighteen he had mastered all the then known sciences. His subsequent progress was due only to his personal judgment.

His training through contact with life was at least equal to his development in intellectual speculation. At the age of twenty-one he wrote his first philosophical book. The following year, however, the death of his father forced him to enter the administration in order to earn his living. His judgment was swiftly appreciated. Having consulted him on medical matters, the princes had recourse to him also in matters of politics. He was a minister several times, his advice being always listened to; but he became an object of envy, sometimes persecuted by his enemies and sometimes coveted by princes opposing those to whom he wished to remain loyal. He took flight and was obliged to hide on several occasions, earning his living by medical consultations. He was imprisoned, escaped, lived for fourteen years in relative peace at the court of Iṣfahān and died at Hamadān, during an expedition of the prince ʿAlāʾ al-Dawla, in 428/1037. He was buried there; and a monument was erected to him to celebrate the (*hidjrī*) millenary of his birth.

If his works are to be understood, they should not be thought of as those of a philosopher who lived in his books. He was occupied all day by affairs of state, and he laboured by night on his great works, which were written with astonishing rapidity. He was never safe, and was frequently compelled to move; he would write on horseback, and sometimes in prison, his only resource for reference being his memory. It has been found surprising that he differs from Aristotle in his works: but he quoted him without re-reading him, and, above all, his independence of mind inclined him to present his own personally worked out thought, rather than to repeat the works of another. Besides, his personal training was different. He was a man who lived in touch with the concrete, constantly faced with difficulties, and a great physician who dealt with specific cases. Aristotle's *Logic* seemed to him insufficient, because it could not be applied in a way that was sufficiently close to life. Many recent controversies have been aroused since the study of his works has increased, especially at the time of his millenary, but the most plausible view of his personality is still the following: he is a scientific man, who attempts to bring the Greek theories to the level of that which needs to be expressed by the study of the concrete, when apprehended by a great mind.

The secret of his evolution, however, will remain concealed from us as long as we do not possess such important works as the *Kītāb al-Inṣāf* , the "Book of Impartial Judgment", which investigated 28,000 questions, and his "Eastern Philosophy", of which we have only a fragment.

Works

The corpus of Ibn Sīnā's works that has come down to us is considerable, but incomplete. To the many questions that were put to him he replied hastily, without always taking care to keep his texts. Al-Djuzadjānī has preserved several of these; others have been transmitted with different titles, others lost. The manuscript of the *Inṣāf* disappeared at the sack of Iṣfahān, in his own lifetime. The fundamental bibliography is that which al-Djuzadjānī included in his biography, but it is not exhaustive. G.C. Anawati lists a total of 276 works, including texts noted

as doubtful and some apocryphal works, in his bibliography of 1950. Mahdavi, in 1954, lists 131 authentic, and 110 doubtful works. Ibn Sīnā was known primarily as a philosopher and a physician, but he contributed also to the advancement of all the sciences that were accessible in his day: natural history, physics, chemistry, astronomy, mathematics, music. Economics and politics benefited from his experience as a statesman. Moral and religious questions (not necessarily pertaining to mysticism), Ḳur'ānic exegesis, statements on Ṣūfī doctrine and behaviour produced minor writings. He wrote poetry for instructional purposes, for he versified epitomes of logic and medicine, but he had also the abilities of a true poet, clothing his philosophical doctrine in images, both in verse (as in his poem on the soul) and in prose, in symbolic narratives whose meaning has given rise to controversy.

Medicine is the subject of separate works; but natural history and mathematics are thought of as parts of philosophy. Thus, his principal treatise on these sciences is included in the great *Kitāb al-Shifā'*, "Book of Healing [of the Soul]", in the same way as that on Metaphysics, while the famous *Ḳānūn fi 'l-ṭibb*, "Canon of Medicine", is a separate work.

The *Ḳānūn* appears to have formed a more consciously coherent whole than the philosophical works. Because it constituted a monumental unity, which maintained its authority until modern times when experimental science began, and because it still remained more accessible than Hippocrates and Galen, it served as a basis for seven centuries of medical teaching and practice.

The *Ḳānūn* is the clear and ordered "Summa" of all the medical knowledge of Ibn Sīnā's time, augmented from his own observations. It is divided into five books. The first contains generalities concerning the human body, sickness, health and general treatment and therapeutics. The second contains the Materia Medica and the Pharmacology of herbs. This passage sets out the three methods—agreement, difference and concomitant variations—that are usually regarded as characteristic of modern science. The third book deals with special pathology, studied by organs, or rather by systems. The fourth book opens with the famous treatise on fevers; then follow the treatise on signs, symptoms, diagnostics and prognostics, minor surgery, tumors, wounds, fractures and bites, and that on poisons. The fifth book contains the pharmacopoeia.

Several treatises take up in isolation a number of the data in the *Ḳānūn* and deal with particular points. Some are very well-known: their smaller size assured them of a wide circulation. Among the most widely diffused are treatises on the pulse, the medical pharmacopoeia, advice for the conservation of health and the study of diarrhoea; in addition, monographs on various remedies, chicory, oxymel, balsam, bleeding. The virtues of wine are not neglected.

Physicians were offered a mnemonic in the form of a poem which established the essentials of Avicenna's theory and practice: principles, observations, advice on therapeutics and dietetics, simple surgical techniques. This is the famous *Urdjūza fi 'l-ṭibb*, which was translated into Latin several times from the 13th to the 17th century, under the title *Cantica Avicennae*.

(A.-M. GUICHON)

2. Some renowned later Physicians

Ibn Abī Uṣaybiʿa

Muwaffaḳ al-Dīn Abu ’l-ʿAbbās Ahmād b. al-Ḳāsim b. Ḵẖalīfa b. Yūnus al-Ḵẖazraḏjī Ibn Abī Uṣaybiʿa was a physician and bibliographer whose patronymic probably derives from the fact that one of his ancestors had a deformed hand. He belonged to a family of physicians and was born in Damascus, after 590/1194. He studied under the principal teachers of his time, notably Ibn al-Bayṭār, who taught him botany; with his father (d. 649/1251) and al-Raḥbī (d. 631/1233) he studied medicine, which he practised in the Nūrī hospital in Damascus and the Nāṣirī hospital in Cairo, and then (634/1236) entered the service of the *amīr* ʿIzz al-Dīn Aybak al-Muʿaẓẓamī at Sarḵẖad, where he died in 668/1270.

He wrote various works on medicine which are now lost, but which are mentioned incidentally in his *ʿUyūn* or by his biographers; among them are: *Iṣābat al-munaḏjdjimīn*, *al-Taḏjārib wa ’l-fawā’id*, *Ḥikāyāt al-aṭibbā’ fī ʿilāḏjāt al-adwā’* and *Maʿālim al-umam*. He is also the author of numerous poems; but he owes his fame to his *ʿUyūn al-anbā’ fī ṭabaḳāt al-aṭibbā’*, a collection of 380 biographies which are of inestimable value for the history of Arabic science, in spite of a number of confusions, some long series of verses which have nothing to do with the main theme, and the one-sidedness of the choice of subjects: he provides no mention of persons such as Ibn Nafīs, who, like him, was a pupil of Ibn al-Dakẖwār (d. circa 628/1230), but whom he disliked. He based his work on the bibliographical productions of his predecessors (Ibn Ḏjuldjul for example), and a comparison between their texts and that of Ibn Abī Uṣaybiʿa shows how he either copies them, very often literally, or summarizes them, and how this mass of raw material was amplified by successive additions; the biographies are arranged by country and by generation (*ṭabaḳāt*). The work appeared in two redactions: a major and a minor. The latter was completed in 640/1242 and, with the addition of new material drawn in part from the *Taʾrīḵẖ al-ḥukamā’* of Ibn al-Ḳifṭī, it produced the major recension (667/1268). From the two redactions a not very careful copyist produced a re-written version after the author’s death.

(J. Vernet)

Ibn Buṭlān

Al-Muḵẖtār (or Yuwānīs = Johannes) b. al-Ḥasan b. ʿAbdūn b. Saʿdūn Ibn Buṭlān was a Christian physician and theologian of Baghdād. He was the foremost disciple of the Christian priest, philosopher and physician, Ibn al-Ṭayyib, and Ibn Buṭlān himself was certainly a Nestorian cleric and probably a priest. He used to teach medicine and philosophy in Baghdād, but left his native city in Ramaḍān 440/January 1049 for a journey which took him by way of Raḥba, Ruṣāfa, Aleppo, Antioch, Laodicea and Jaffa to Cairo, where he arrived in Djumādā II 441/November 1049. In Aleppo he was honoured by the Mirdāsid governor Muʿizz al-Dawla Thimāl b. Ṣāliḥ, and he advised him on the healthiest location of a hospital which was to be built there; the governor also authorized him to regulate the worship of the Christians, but these last disliked the rules which he made. In Cairo, he became the target of the hostility of his Egyptian colleague, Ibn Riḍwān, and there ensued

a remarkable medico-philosophical controversy in which the two adversaries tried to exhibit their entire erudition, particularly in Greek medicine and philosophy. "Ibn Buṭlān was the more gracious in style, more spirited and more distinguished in literature and subjects connected with it" (Ibn Abī Uṣaybiʿa). After a stay in Cairo of three or four years, he went to Constantinople where he arrived in the summer of 446/1054; his arrival there coincided with the crisis which led to the schism between the Greek and the Latin Church, and the Patriarch, Michael Cerularius, asked Ibn Buṭlān to compose for him a treatise on the doctrine of the Eucharist, and in particular on the controversial point of the use of unleavened bread. Ibn Buṭlān stayed in Constantinople for one year and then returned to Syria, alternating between Aleppo and Antioch; he was for some time in the service of Abu 'l-Mutawwaḏj Muḳallad b. Naṣr b. Munḳiḏh (d. 450/1059), the great-grandfather of Usāma b. Munḳiḏh; in 455/1063 we find him supervising the building of a hospital in Antioch and at the same time engaged in literary work. Finally he became a monk and retired to a monastery in Antioch; he died on 8 Shawwāl 458/2 September 1066 and was buried in the church of the monastery.

The literary production of Ibn Buṭlān is distinguished by its originality. (1) His main work is the *Taḳwīm al-ṣiḥḥa*, a synopsis of hygiene and macrobiotics in the form of tables, an arrangement borrowed from works of astronomy; Ghazālī in the preface of his *Iḥyāʾ* refers to it as his precedent for using an arrangement familiar to the readers from another branch of learning, and it served as a model for the *Sulūk al-mālik fī tadbīr al-mamālik*, a "mirror for princes" by Ibn Abi 'l-Rabīʿ (wrote 655/1256). It was translated into Latin with the title *Tacuini Sanitatis Elluchasem Elimithar Medici de Baldath*, Argentorati 1531, second ed. 1533, and into German, by Michael Herr, with the title *Schachtafeln der Gesundheit*, Strassburg 1533. Another Latin treatise of hygiene is based on this work. (2) *Daʿwat al-atibbāʾ*, "The Medical Dinner Party", written in 450/1058 and dedicated to Naṣr al-Dawla Aḥmad b. Marwān, the Marwānid ruler of Mayyāfāriḳīn (401/1010–453/1060), a witty skit on quacks, their ignorance and arrogance, with remarks on the ethics of the medical profession. A commentary by a Christian author of Baghdād dates from the 6th/12th century. (3) *Tadbīr al-amrāḍ al-ʿāriḍa ʿala 'l-akthar bi-'l-aghdhiya al-maʾlūfa wa-'l-adwiya al-mawdjūda yantafiʿu bihā ruhbān al-adyira wa-man baʿuda min al-madīna*, a treatise on homely remedies, particularly for the benefit of monks. (4) *Risāla fī shirāʾ al-raḳīḳ wa-taḳlīb al-ʿabīd*, on how to buy slaves and how to detect bodily defects. (5) Two treatises directed against Ibn Riḍwān dating from 441/1049–50; a third and final treatise, written after Ibn Buṭlān had left Cairo, and called *Wakʿat al-aṭibbāʾ*, has not been preserved. (6) A report of Ibn Buṭlān, addressed at his request to the man of letters and minister, Hilāl al-Sābiʾ, on his journey from Baghdād to Cairo; it was incorporated in Muḥammad b. Hilāl's *Kītāb al-Rabīʿ* , and considerable extracts have been preserved in the biography of Ibn al-Ḳifṭī and the *Geographisches Wörterbuch* of Yāḳūt. This report contains most valuable descriptions of Aleppo, Antioch, Laodicea and other cities at the time of Ibn Buṭlān's visit. The treatise, together with other indications, shows the kind of society in which Ibn Buṭlān moved. (7) Ibn Buṭlān's "Treatise on the Eucharist", *Maḳāl fi'l ḳurbān al-muḳaddas*, hastily written in the summer of 446/1054. (8) Quotations from his notes for an autobiography, with remarks on the epidemics which he witnessed, have

been preserved by Ibn Abī Uṣaybiʿa. (9) Ibn Buṭlān's last recorded work, on which he worked in 455/1063, is a Discourse, *Maḳāla*, "on the reason why the skilled physicians have changed the treatment of most diseases which were formerly treated with hot remedies, advising in their place a cooling treatment, e.g. for plegia, facial paralysis, paresis and others, and why they disagree with the rules laid down by the Ancients in compendiums (*kanānīsh*) and pharmacopoeias (*aḳrābādhīnāt*), and how this new system has gradually gained ground in ʿIrāḳ and the neighbouring countries from the beginning of the year 377/988 down to the year 455"; Ibn Buṭlān refers to changes in climate and subsequent changes in vegetation; extracts have been preserved in the biographies of Ibn Abī Uṣaybiʿa and of al-Ṭabbākh, who quotes Abū Dharr al-Ḥalabī. Ibn Buṭlān's refusal to follow slavishly the doctrines of the Ancients, notwithstanding his deep knowledge of them, also appears from his controversy with Ibn Riḍwān.

(J. Schacht)

Ibn Riḍwān

Abū 'l-Ḥasan ʿAlī b. Riḍwān b. ʿAlī b. Djaʿfar al-Miṣrī Ibn Riḍwān was a renowned physician and medical author and polemist of Egypt. We are well informed about his life and personal circumstances because he composed an autobiography, the essence of which has been preserved by Ibn Abī Uṣaybiʿa, when he was approaching sixty. It is pervaded by a strong feeling of complacency which is, perhaps, explained by his experiences and explains, in its turn, his addiction to polemics. He was born in 388/998, the son of a baker in Giza near Cairo. He was very poor, had a hard youth, and had to earn his living and the money for his instruction by astrological forecasting in the streets and by similar means. He never had a teacher in medicine, which became a matter of reproach to him later, and he studied exclusively from books. He says himself that he did not possess the means to pay the apprentice's fee demanded by medical practitioners. He also was unable to marry until he was thirty. But after his thirtieth year he began to acquire a good medical reputation, and when he was appointed Chief Physician of Egypt by the Fāṭimid Caliph of Cairo (it cannot have been Ḥākim who disappeared in 411/1021, when Ibn Riḍwān was only twenty-three years old, but was probably al-Mustanṣir, 427/1036–487/1094), he acquired prosperity and wealth. Abu 'l-Muʿaskar Ḥusayn b. Maʿdān, the ruler of Makrān, consulted him when he was stricken by hemiplegia. Ibn Riḍwān never left Egypt and perhaps not even the immediate neighbourhood of Cairo, where he became "one of the foremost to give information about the branches of knowledge in which he claimed authority" (Ibn al-Ḳifṭī). The site of his house remained known for a long time. According to Ibn Abī Uṣaybiʿa, he adopted an orphan girl in the period of famine and plague which started in 445/1053, and he educated her and she grew up in his house; but once when he left her alone, she took gold to the amount of 20,000 dīnārs and valuables and fled, and nothing more was heard of her; thereafter, his mind became deranged. Ibn Riḍwān was inclined to acrimonious polemics against his predecessors and contemporaries, including Ḥunayn b. Isḥāḳ, al-Rāzī, Ibn al-Djazzār, Ibn al-Ṭayyib, Ibn Buṭlān and others. Whereas he is unanimously praised as a medical practitioner, and Ibn Abī Uṣaybiʿa calls him "a better medical man (than Ibn Buṭlān) and better trained

in the philosophical and associated sciences", he seems to have been unhappy in his personal relationships. According to Ibn al-Ḳifṭī, "he was a man of narrow mind and not of sound judgment. He was, moreover, not of good looks and appearance. Nevertheless, many pupils followed his lectures and studied under him, and his fame spread abroad"; but "his pupils used to relate about him ridiculous things concerning his medical argumentations, astrological sayings and logical assertions, if those who have related them are right." Among his disciples were the Fāṭimid prince, philosopher, author and bibliophile al- Mubashshir b. Fātik, and the Jewish physician and bibliophile Afrāʾīm (Ephraim) b. al-Zaffān; he was also in friendly relations with an otherwise unknown Jewish physician, Yahūdā b. Saʿāda, to whom he addressed two treatises. Ibn Riḍwān died, according to Ibn Abī Uṣaybiʿa, in 453/1061.

Ibn Riḍwān's literary output was very extensive; the list of titles given by Ibn Abī Uṣaybiʿa, if duplicates are eliminated, comes near to one hundred, though many of them no doubt represent short treatises, unfinished notes, and the like. Some twenty have been preserved in manuscripts. A few are concerned with astronomy, logic, philosophy and theology but the great majority are medical and in substance follow closely the works of Galen. Ibn Riḍwān possessed a wide knowledge of ancient medicine but he was not an original thinker, being a mere exponent of Hippocrates's and Galen's thought, without adding anything of his own; this was clearly seen by Ibn al-Ḳifṭī, who called his works not very important, derivative, but well arranged. This lack of originality becomes almost a positive quality in the thought of Ibn Riḍwān, to such a degree that he did not allow an original thinker such as al-Rāzī to deviate in the least from the thought of Galen, and indeed most of his polemics have their starting-point in this contention of his. In addition, as Ibn Abī Uṣaybiʿa observes, Ibn Riḍwān "was insolent in what he said, and he abused those with whom he had an argument". This is amply borne out by the contents of his treatises against Ibn Buṭlān (see below).

Among his more important and better known works are: (1) a Commentary on the *Quadripartitum* of Ptolemy (*Sharḥ al-maḳālāt al-arbaʿ li-Baṭlūmiyūs*); it was translated into Latin and into Turkish, and the Latin translation was printed, together with the *Quadripartitum*, among the incunabula of Venice (and later) several times; (2) a Commentary on Galen's *Ars parva* (*Sharḥ al-ṣināʿa al-ṣaghīra li- Djālīnūs*); this, too, was translated into Latin, and the translation was repeatedly printed, together with the text of Galen, before and after 1500; it was also translated into Hebrew; (3) *Kitāb Uṣūl fi 'l-ṭibb*, a compendium (*kunnāsh*), another of Ibn Riḍwān's books to have been translated into Hebrew; (4) *al-Kitāb al-Nāfiʿ fī taʿlīm ṣināʿat al-ṭibb*; in this book Ibn Riḍwān, displaying a remarkable knowledge of Greek medical writers, tries to show that learning medicine from books is preferable to learning it from teachers, turning the necessity of his own study into a virtue; the work contains important information on the transmission of Greek science to the Arabs; (5) *Risalā fī daf ʿ maḍārr al-abdān bi-arḍ Miṣr*, a treatise dealing with the conditions of health and disease in Egypt and Cairo, the plague and its causes, preventive measures and hygienic rules for the inhabitants of Egypt, including a medical topography of Cairo and its suburbs in the 5th/11th century; (6) finally, his controversy with Ibn Buṭlān of which three treatises of his have been preserved, whereas two and perhaps three more have been lost; the controversy

started from a disputed point of physiology, and finished with Ibn Riḍwān calling upon the practitioners of Cairo to boycott Ibn Buṭlān.

(J. Schacht)

Ibn Biklārish

Yūsuf (Yūnus?) b. Isḥāḳ al-Isrāʾīlī Ibn Biklārish was a Judaeo-Arab physician and pharmacist who lived in Almeria *ca.* 1100 A.D. There he wrote the *K. al-Mustaʿīnī* for al-Mustaʿīn billāh Abū Djaʿfar Aḥmad b. Yūsuf al-Muʾtamin billāh (reigned 478–503/1085–1109), the Hūdid ruler of Saragossa, after whom the work was named.

The book must have attracted attention immediately, for it is often quoted by al-Ghāfiḳī, a younger contemporary of Ibn Biklārish, in his *K. al-Adwiya al-mufrada*; in the Latin version of the latter under the name Buclaris or Boclaris (i.e. from Biclaro?). It is also remarkable that both authors quote almost the same sources. After a theoretical explanation of pharmacology which is essentially based on Galen, the *Mustaʿīnī* contains a special table-like section, arranged in five unequal columns. The first two small columns give the names (*asmāʾ*), and characteristics (*ṭibāʿ*) of the simple medicines, the third (*tafsīruhā bi-ʾkhtilāf al-lughāt*) contains their explanation together with their Greek, Syriac, Persian, Latin and Mozarabic synonyms, the fourth the Succedanea (*abdāl*) and the fifth their utility, specific effect and region of application (*manāfiʿuhā wa-khawāṣṣuhā wa-wudjūh istiʿmālihā*). The covering text on the upper and lower margin contains further details, and above all the sources. The order of the total of 704 drugs follows the *abdjad* alphabet in its Maghribī form. In Europe, attention has been given so far almost exclusively to the third column (synonyma): it contains important vocabulary material, especially of the Romance languages.

Of other writings of Ibn Biklārish, only one work on dietetics is known by its title; in the introduction to the *Mustaʿīnī* it is quoted twice as *Risālat al-Ṭabyīn wa ʾl-tartīb*.

(A. Dietrich)

Ibn al-Tilmīdh

Abū ʾl-Ḥasan Hibat Allāh b. Abi ʾl-ʿAlāʾ Ṣāʿid b. Ibrāhīm Ibn al-Tilmīdh, with the honorific names of Muwaffiḳ al-Mulk and Amīn al-Dawla (he was widely known under the latter name), was a Christian Arab physician of Baghdād, where he was born in the second half of the 5th/11th century, and son of a very eminent physician. He completed his education in various branches of learning by making fairly long journeys in Persia, and then returned to settle in Baghdād, where he succeeded his father. He seems to have been extraordinarily gifted: in addition to his fine command of Arabic, he knew Syriac and Persian, was skilled in poetry and music, and was also an excellent calligrapher. He was well-versed in Christian theology, and evidently also in the Muslim religion, since he wrote on medical questions treated in *ḥadīth*s. He appears to have been a priest, and he was the leader of the Christian community of Baghdād. As a physician, he was highly esteemed by his contemporaries and his successors, for example ʿAbd Laṭīf; he enjoyed the favour of the caliphs al-Muḳtafī, al-Mustandjid and al-Mustaḍīʾ, and he remained until his death the Christian director (*sāʿūr*, a Syriac title) of the famous hospital founded by ʿAḍud al-Dawla in the capital.

He was appointed by al-Mustaḍīʾ as head of all the physicians, and, in this capacity, was instructed to examine the professional competence of all the physicians of Baghdād and the surrounding district. Ibn Abī Uṣaybiʿa relates an amusing scene which took place during an examination of this type. Ibn al-Tilmīdh died on 28 Rabīʿ I 560/12 February 1165 in Baghdād at the age of 95 lunar years (92 solar years), leaving to his son a considerable fortune and a large library, which on the son's death became the property of the state. It appears from the various information given by the Arab historians that Ibn al-Tilmīdh made use of the works of the Greek physicians, and also of the great *Ḳānūn* of Ibn Sīnā as the basis of his teaching on the theory of medicine. He acquired a following of eminent disciples (Fakhr al-Dīn al-Māridīnī, Ibn Abi 'l-Khayr al-Masīḥī, Raḍī al-Dīn al-Raḥbī, Muwaffiḳ al-Dīn b. al-Maṭrān, etc.), the majority of whom later went from ʿIrāḳ to Syria and Egypt, where they founded new medical schools which began to flourish in Egypt in the 7th/13th century. Ibn al-Tilmīdh left a whole series of medical works; they are not in fact original, but consist for the most part of commentaries on or summaries of works from the Hippocratic *Corpus* and from Galen, or of works by Ibn Sīnā, Rāzī, Ḥunayn and other Christian physicians. His pharmacological works are nevertheless often quoted, in particular an *Aḳrābādhīn* (Pharmacopoeia) and two abridged versions of it intended for use in hospitals. In the ʿAḍudī hospital they replaced the Pharmacopoeia of Sābūr b. Sahl (d. 255/869), which had been used until then. These works and some others (a treatise on bleeding and a practical manual of medical treatment) have survived in manuscript.

(M. Meyerhof)

Ibn al-Nafīs

ʿAlāʾ al-Dīn Abu 'l-ʿAlāʾ ʿAlī b. Abi 'l-Ḥaram al-Ḳurashī al-Dimashḳī Ibn al-Nafīs was a distinguished physician and many-sided author of the 7th/13th century. Except for the date of his death, only few facts of his life have been recorded, because Ibn Abī Uṣaybiʿa, although his contemporary, does not mention Ibn al-Nafīs in his history of physicians; but al-ʿUmarī and al-Ṣafadī give detailed though anecdotal accounts of him and his personal habits. Born in or near Damascus (presumably in the village of al-Ḳurashiyya), he studied medicine there under Muhadhdhib al-Dīn ʿAbd al-Raḥīm b. ʿAlī known as al-Dakhwār (d. 628/1230), who came from the school of Ibn al-Tilmīdh, who in his turn had formed many disciples several of whom came from Baghdād to Damascus. Besides medicine, Ibn al-Nafīs studied grammar, logic, and Islamic religious sciences. At an unknown date he moved to Cairo, where he was given the important post of Chief Physician of Egypt and became the personal physician of sultan Baybars I. He presumably worked at the Nāṣirī hospital and trained a number of pupils. The best known among them was Ibn al-Ḳuff, author of a work on surgery. He lectured on Shāfiʿī law at the Masrūriyya *madrasa*. The famous grammarian, Abū Ḥayyān al-Gharnāṭī, was his disciple in logic and praised his teaching. His contemporary, the philologist Ibn al-Naḥḥās, praised his style in grammar. He became rich and had a luxurious house built for himself in Cairo. He died in Cairo on 21 Dhu 'l-Ḳaʿda 687/18 December 1288 at the age of about 80 (lunar) years, and left his house, his fortune and his books to the Manṣūrī hospital there, founded by sultan Ḳalāwūn and only recently completed (683/1284). In prescribing,

"he never departed from the method to which he was accustomed; he did not prescribe a remedy as long as he could prescribe a diet, and he did not prescribe a compound remedy as long as he could content himself with a simple drug" (al-ʿUmarī). Notwithstanding these modern ideas on treatment, and although Ibn al-Nafīs was exalted by his admirers as a second Avicenna, he seems to have been a learned theorist rather than a practical physician, but the range and depth of his general culture are impressive.

The literary activity of Ibn al-Nafīs was important and extensive. He was mainly a commentator but one of independent mind and very extensive knowledge. He is said to have written most of his works out of his head without reference to books, which seems to be confirmed by the fact that as a rule they contain, as far as they are not commentaries, very few references to earlier works. His main writings are: (1) the *Kitāb al-Shāmil fi 'l-ṭibb*, an encyclopaedia of medicine which was to have consisted of three hundred volumes (this word to be taken in the conventional meaning of some ninety folios), of which only eighty volumes were completed; several volumes exist, partly in the autograph of the author, 203–10); (2) the *Kitāb al-Muhadhdhab fi 'l-kuḥl*, a comprehensive but not very original record of the whole knowledge of the Arabs in ophthalmology; it was used by several later authors; (3) the *Mūdjiz Ḳānūn*, an extract from all parts of the *Ḳanūn* of Ibn Sīnā, but omitting anatomy and physiology; it is a concise manual of the whole of medicine, particularly useful for the practitioner, and among the works of Ibn al-Nafīs it has met with the greatest success in the Oriental medical world; it exists in numerous manuscripts, was printed or lithographed a number of times, was the subject of a series of commentaries and glosses, the most reputed of which, by Nafīs b. ʿIwaḍ al-Kirmānī (completed 841/1437), was lithographed in India for the last time as recently as 1328/1910; it was also translated into Turkish and into Hebrew. (4) Among the medical commentaries written by Ibn al-Nafīs the most widely disseminated one is on the Aphorisms (*Fuṣūl*) of Hippocrates; he also wrote commentaries on Hippocrates's Prognostics, Epidemics, and *De natura hominis*; (5) he further commented upon the *Masā'il fi 'l-ṭibb* of Ḥunayn b. Isḥāḳ, (6) and he wrote an extensive commentary on the *Ḳānūn* of Ibn Sīnā which exists in numerous manuscripts, improving the arrangement of the subject-matter and, in particular, collecting the passages relating to anatomy from the first three sections of the *Ḳānūn* and commenting on them in a separate section, which was often copied as an independent book; in this section, Ibn al-Nafīs sets out his theory of the lesser circulation of the blood (see below); his commentary on the fifth section of the *Ḳānūn* was translated into Latin by the Renaissance physician and scholar Andrea Alpago and posthumously printed in Venice 1547. (7) Of the writings of Ibn al-Nafīs on logic, there exists his commentary on his own *Kitāb al-Wurayḳāt*, a summary of the contents of Aristotle's *Organon* and *Rhetoric*; the section summarizing the *Analytica Priora* includes a discussion of the legal proofs in Islamic law and of the limited value of *ḳiyās* from the point of view of logic. His writings on grammar and rhetoric, and his commentary on the *Tanbīh* of Shīrāzī (if the mention of this last work by al-Subkī is not merely the result of an error) do not seem to have survived, but the *Mukhtaṣar fī ʿilm uṣūl al-ḥadīth*, on the science of tradition, has been preserved. (8) There is, finally, *Risāla al-Kāmiliyya fi 'l-sīra al-nabawiyya*, which can be freely translated as *The Theologus Autodidactus*.

In this intellectual tour de force, which was already admired by his contemporaries, Ibn al-Nafīs set out to show, by abstract reasoning which he put into the mouth of a solitary person, called Kāmil, on a desert island, that the events in the life of the Prophet and in the history of the community of Muslims, including the incursion of the Mongols in his own lifetime and even the physical appearance of the Muslim ruler, no doubt sultan Baybars, were the best things that could possibly have happened and therefore, under divine providence, unavoidable. He ends with a naturalistic explanation of the Last Things.

The most important achievement of Ibn al-Nafīs in the field of medicine is his theory of the lesser or pulmonary circulation of the blood, from the right ventricle of the heart through the pulmonary artery (*vena arteriosa*) to the lung and from there through the pulmonary vein (*arteria venosa*) to the left ventricle of the heart, boldly contradicting the accepted ideas of Galen and of Ibn Sīnā and anticipating part of William Harvey's fundamental discovery; in contrast with Harvey, who started from experiment, Ibn al-Nafīs derived his theory from the same kind of abstract reasoning as in the *Theologus Autodidactus*. This remarkable theory, perhaps because of its unorthodox character, was almost completely ignored by the later Arab medical authors, excepting only an anonymous commentator of the *Ḳānūn* who agrees with it, and an otherwise unknown al-Fāḍil Baghdādī in his commentary on the *Ḳānūnǧa*, an extract from the *Ḳānūn* by Maḥmūd b. Muḥammad al-Čaghmīnī (d. 745/1344), who made it his object to refute Ibn al-Nafīs's criticisms of Ibn Sīnā. A theory of the lesser circulation, identical in all essential respects with that of Ibn al-Nafīs and expressed in terms strangely reminiscent of those used by him, was formulated by Michael Servetus in his *Christianismi restitutio* (Vienna 1553), and an exposition of the same doctrine by Realdus Columbus (Realdo Colombo) in his *De re anatomica libri XV* (Venice 1559) forms a close parallel to this. Detailed philological analysis has made it probable that Servetus (and perhaps Colombo, too) had direct knowledge of the theory of Ibn al-Nafīs, and it is likely that this knowledge was transmitted by Andrea Alpago, who spent more than 30 years in Syria, travelled widely in search of Arabic manuscripts, and is known to have translated from the Arabic numerous medical texts not all of which were printed posthumously (he died about 1520).

(Max Meyerhof [J. Schacht*])

3. A Miscellany of Medicinals

Endive (Ar. Hindibāʾ)

Cichorium endivia, the cultivated form of a species of the ligulate chicory family. Through Syriac *anṭūbiyā*, both terms *hindibāʾ* and "endive" go back to Greek ἴντυβος, which is recorded only sporadically; normally the plant is called σέρις, in the Arabic translations *sāris* or *sarīs*. The nomenclature, rich and confused, can be summarised as follows: the wild endive (*hindibāʾ barrī*) was already known to the earlier Arab botanists under various names: *ʿalaṯh* or *ġalaṯh*, further *yaʿḍīd*, *baḳla murra*, *ṭarḫašḫūḳ* and variants. As indicated by the last but one name, it is a "bitter vegetable" and is therefore also called *amarūn* (and variants). The latter term is not of Greek origin, as the books on medicine have it, but is to be derived from Latin *amarum*. The cultivated endive, usually called *hindibāʾ*, is the popular, tasty

salad-plant, particularly widespread in the Arab West and known there under the Mozarabic name *s̲harrāliya* or its arabicised form *sarrāk̲h* (Castilian *sarraja*), while in Morocco the Berber term *tīfāf* is mainly used.

The medicinal effect of endive was exceptionally extensive, as can be seen in Ibn al-Bayṭār's long article, where numerous older sources are indicated. It is above all effective against eye-diseases and poisoning, in minced form also against boils when in their initial stage, and it strengthens the liver and stomach. The root helps against scorpion-stings, and the juice against jaundice, constipation, persistent fever and suppurations. The *ṭarḵhas̲hḵūḳ* mentioned above is *taraxacum*, the dandelion used in popular medicine because of its bitter substance.

(A. Dietrich)

Gum resins

Ṣamg̲h or *ṣamag̲h* (A., pl. *ṣumūg̲h*) indicates gum resins, the desiccated latexes of several plants and the mixtures of natural resins (*rātīnad̲j*) with gum-like substances.

To the best-known gum resins belong: ammoniac (*wus̲h̲s̲haḳ*), the product of the ammoniac gum tree; the so-called devil's dirt (*ḥiltīt*), the latex of the asafoetida (*and̲jud̲h̲ān*) which, when exposed to the air, hardens into a dirty-yellow gum resin; wolfs' milk (*yattūʿ*), in several varieties of the class Euphorbia, with many sub-varieties; galbanum (*ḳinna*), the desiccated latex of *Ferula galbaniflua*, used as spice and medicine; myrrh (*murr*), from the bark of several varieties of thorny shrubs of *Commiphora abyssinica*; the often-described frankincense (*kundur*) from various Boswellia varieties, indigenous in South Arabia and Somalia; sagapenum (*sakbīnad̲j*), the yellow, translucent resin from *Ferula Scowitziana* which causes irritation of the skin and whose smell resembles that of asafoetida; and camphor (*kāfūr*), the white, transparent mass of the camphor tree *Cinnamonum camphora*, indigenous in East Asia.

The word *ṣamg̲h* is usually used alone for *ṣamg̲h ʿarabī*, gum arabic, so called because it was exported from Arab ports and spread by the Arabs. It is the viscous secretion gained from the bark of the acacia tree (*al-ḳaraz*, in Morocco *al-ṭalḥ*), which represents several varieties of the acacia imported from Africa: *Acacia senegalensis*, from the steppe zones of West- and Central Africa to the right and left of Senegal, *Acacia abyssinica* and *Acacia nilotica*, from Africa and India, and many others.

In medicine, gum arabic is used as a palliative and as an astringent for drying up putrescent ulcers. It helps the formation of new flesh in ulcers and stems the blood which flows from wounds; it also serves as cough medicine and for the preparation of collyria. The drug consists of roundish, colourless or yellowish pieces, up to a diameter of three cm, which fall easily into small pieces which shine like glass.

(A. Dietrich)

Anzarūt

Anzarūt, Greek σαρκοκολλα, is a gum-resin from a thorn-bush which cannot be identified with certainty; known from antiquity, it is used for medical purposes. Synonyms are: *anzarūṭ, ʿanzarūt, kuḥl fārisī, kuḥl kirmānī*; in Persian: *anzarūt* or *and̲jarūt, tas̲hm* (< *čas̲hm*), *kand̲jubā, kand̲jud̲ha, kand̲judak, bāzahr-i čas̲hm*. Much has been written on this drug. Formerly, the species Penaea, belonging to the Thymelaeaceae,

was generally considered to be the original plant, namely either *Penaea mucronata* L., or *P. Sarcocolla* L. or *P. squamosa* L. But in 1879 W. Dymock was able to prove that at least the Persian Sarcocolla is the product of what he called *Astragalus Sarcocolla* Dym. (Leguminosae). Widely known in antiquity, the drug has practically disappeared from the European store of medicines, but, according to Meyerhof, it is still well-known in the Orient, especially in the drug market in Cairo.

According to Dioscorides, the yellowish bitter resin was above all useful for causing new flesh wounds (σάρξ "flesh", κόλλα "glue") scar over. Already al-Kindī used it as component of a good number of recipes, among others for leprosy. The most detailed description is given by Ibn al-Bayṭār on the basis of Greek and Arabic sources as well as his own observations. The resin consumes the festering flesh of putrescent abscesses, assists the ripening of tumours, carries away mucus and yellow gall, and is a remedy for inflammations of the eye, for agglutinating eyelids and for excessive secretion of the eye. Taken internally, the resin is a strong purgative, but causes also the hair to fall out. The best Sarcocolla consists of crushed, white seeds, mixed with walnut oil. Measured out in different ways, it can be mingled with other drugs (sagapenum, myrobalanum, aloes, bdellium, etc.). When taken neat, the resin can be lethal; therefore, the dose should not be more than 2¼ *dirham*s. Ibn al-Bayṭār, however, maintains that he saw in Egypt women partaking, immediately after a bath, of up to 4 ounces of *anzarūt*, together with the pulp of the yellow melon, hoping to increase thus their corpulence.

(A. Dietrich)

Scorpion (Ar. ʿAḳrab)

This branch of the *arachnida*, which is met with as far north as lat. 45°, includes, in Asia and Africa, some species whose sting produces effects of a more or less serious nature, and sometimes even death. For this reason the scorpion has always haunted the imagination of oriental peoples; it has found a place among the stars (a constellation and the 8th sign of the Zodiac are named after it), and has played some part in the magic and the interpretation of dreams. As a protection against its sting, magic formulas and, later, verses of the Ḳurʾān, were used, engraved on rings and other talismans; according to the Traditions, Muḥammad saw no objection to this practice. The observations of Arab naturalists, who claimed that the scorpion escaped from pain and intense heat by committing suicide, and that the female carried its young on her back and ultimately perished in this way, have been confirmed in modern times. The behaviour of the scorpion when confronted by human beings, and the effect of its sting on different victims, were noted at an early period; different species were identified; but above all, efforts were made to discover a remedy against its sting. The best method, apart from sucking the venom from the wound, was to cut the animal open and place it on the affected part. The scorpion played an important part also in Arab medicine; its ashes were an effective remedy against calculus; its roasted flesh would cure the eye complaint known as *rīḥ al-sabal*. Scorpion oil (*duhn al-ʿaḳārib*), prepared in various ways, was considered to possess particularly curative powers; it was used in the treatment of malignant sores, sciatica and pains in the back, orchitis, and falling hair. In addition, cases are quoted

in which hemiplegia and fever were cured by a scorpion sting.

(J. HELL*)

Mollusc

Ṣadaf (A., sing. *ṣadafa*) denotes two classes of molluscs: 1. Mussels (*Lamellibranchiata*); 2. Snails (*Gastropoda*), both including the mother-of-pearl. To the edible mussels belong the oysters (*aṣṭūrū* < ὄστρειον) and, as a popular foodstuff, the common mussel, *Mytilus edulis L., Gr.* μύακες, which, from the ancient pharmacology of Dioscurides, came into the Arabic pharmacopoeias as *miyāḳis*. The same applies to the flat mussel, *Tellina planata*, Gr. τελλῖναι, Ar. *dillīnas*. The juice of mussels known as χῆμαι, Ar. *ḵẖīmī* (probably *Chana Lazarus* L.) is said to get the digestion going.

Among the snails, the most important are several varieties of the Murex species of the family of the Purpura (*ṣadaf furfūrā* or *ṣadaf al-firfīr*, Gr. πορφύρα). The hypobranchial gland, situated in their mantle cavity, secretes the costly purple dye. Ibn Djuldjul relates that this snail is found in the Algarve and near Algeciras, and that only the Byzantine Emperor is entitled to wear purple. The horny shells of various water-snails, among which the Gr. ὄνυξ, Ar. *ūniḳs*, are valued because of their aroma; with regard to their claw-shaped feet, they are also called *aẓfār al-ṭīb* "aromatic claws". The interior of the Purpura and of the trumpet-snail (*Tritonium nodiferum* L., Gr. κήρυκες, Ar. *ṣadaf ḳīrūkis*), known as Gr. κιόνια, Ar. *kiyūniyā*, "columella", used to be burned for its etching power. The general term for snail in Arabic is in general *ḥalazūn*; in addition to this, the κοχλίας of Dioscurides was taken over as *kuḵẖliyās* and explained by way of *ḳawḳan*, the usual term in Hispano-Arabic. Ibn al-Bayṭār mentions a *ṣadaf al-bawāsīr* which, according to its name, was appropriate for the treatment of hemorrhoids; it was indigenous to the Red Sea coast. Ibn Hubal mentions a Babylonian and a Red Sea snail (*ṣadaf bābilī/ḳulzumī*).

In pharmaco-zoology, all varieties of mussels and snails are grouped together as *Limnaces*. Since Dioscurides, the burnt shells of various land and sea snails, mussels and oysters have been in use. Burned with salt in a pan, the shells proved to be a good dentifrice. With the ashes, ulcers could be cleansed and the healing of fresh wounds be quickened. The meat of the trumpet snail is tasty and digestible. Common mussels, when burned and mixed with honey, soften swollen eye-lids, remove obscuration of the pupils, etc.

(A. DIETRICH)

Anemone

Sḥaḳīḳat al- Nuʿmān (Ar.) is the anemone. It flourishes in the lands around the Mediterranean and in Asia Minor. The *Anemone coronoria L.* or the *Anemone hortensis L.*, Ranunculaceae, qualify as mother plants. Both *sḥaḳīḳat* (*sḥaḳā'iḳ*) *al-nuʿmān* and the words *sḥaḳā'iḳ* and *nuʿmān* taken separately are in general synonymous. Other synonyms are *sḥaḳir*, Persian *lāla*, Berber *ṭīkūk*, in Spanish Arabic *ḥababawar* < Castilian *hamapola* < *papaver*, Greek *arghāmūna* (= ἀργεμώνη, the poppy, instead of ἀνεμώνη). So far a satisfactory explanation of the name has not been given.

In medicine, the anemone at present seems hardly to be used any more. In the drug bazaar in Cairo, pulverised petals of the anemone are sold as decoctions against ailments of the eye. According to the Arab authors, the anemone is above all useful against skin diseases, and it dissolves ulcers and supports their ripening.

Its juice blackens the pupil, cuts off an incipient cataract, strengthens the eye and sharpens the eyesight. Boiled together with their stalks, anemones further the formation of milk. If a woman inserts the anemone with the help of a woollen tampon (*ṣūfa*), she increases the flowing of the menstrual blood (i.e. if an abortive effect is aimed at). Ibn Riḍwān is even of the opinion that seeds of anemones, if taken during several consecutive days, would cure leprosy.

(A. Dietrich)

Myrobalan

Arabic *halīladj* is the plum-like fruit of the Terminalia chebula-tree, a Combratacea of South-Asia and the Malayan archipelago. Being a useful and cheap substitute (*badal*) for gall or oak-apples (*ʿafṣ*), they were used already in antiquity for extracting tannic acid and as a medicine. The term appears also as *ahlīladj* or *ihlīladj* and goes through Persian *halīla* back to Sanskrit *harītakī*. Synonyms are *hārsar* (indicated as "Indian" and probably to be derived from the Sanskrit term mentioned above), and *mufarfaḥ* (with variants). These fruits were allegedly unknown to the earlier Greeks: the βάλανος μυρεψική of Dioscorides is the fruit of a kind of Meringa, known to the Arabs as behennut (*bān*). The later Greeks called this μυροβάλανος ("salve-acorn"), and when the Arabs imported from India the real myrobalanus both were confounded, notwithstanding their completely different medical effect.

The Arabs knew five kinds of myrobalanus, all of which had reached Europe perhaps already at the time of the School of Salerno, but they were imported in great quantities and used in the Western pharmacies only through the trade of the Portuguese. The following kinds are under discussion: (1) the yellow myrobalanus (*halīladj aṣfar, Terminalia citrina*). Its juice has an aperient effect and purges yellow gall. As an ointment, it dries up wound-boils, and pulverised and diluted with rose-water, it heals burns; (2) the myrobalanus of Kābul (*halīladj kābulī*), the ripe fruit of *Terminalia chebula*, is considered as the finest. Its effect is like that of the first one and, besides, it has the property of conferring a lucid intellect; (3) the black myrobalan (*halīladj aswad*), the unripe fruit of the *Terminalia chebula*, as large as a small olive; (4) *balīladj, Terminalia bellerica*; and (5) *amladj*, useful against haemorrhoids, in the Eastern and Western Middle Ages considered as a kind of myrobalanus, in fact, however, the fruit of a completely different family of plants, namely the *Phyllanthus emblica* (Euphorbiaceae). However, the nomenclature is not established with certainty.

The fruits were harvested at various stages of ripeness: small, unripe, dried, they served as medicine; the ripe fruits of the size of walnuts were used for the preparation of tannin, which was in high demand. In India, where the myrobalanus tree is indigenous, the fruits were widely used as medicine, especially as stomachics and purgatives; the Tirphala or Triphala ("tri-juiced medicine"), consisting probably of three of the kind mentioned above, was in particular esteemed. The Arabs mixed the fruits with spices in order to increase their digestive effect. The myrobalanus has now disappeared from the pharmacopoeias in the West, but may still be used here and there in the East; only for the preparation of tannin is it still to be found on the market.

(A. Dietrich)

Aloe

Ṣabr (*ṣabir, ṣabur*) (Ar.) denotes the aloe, a species of the *Liliaceae*, which was widespread in the warm countries of the ancient world, mainly in Cyprus and on the mountains of Africa.

The leaves of many varieties provide fibres ("aloe-fibres") for spinning coarse cloths, and from the aloe's dark-brown wood a valued perfumery is won. Important was also the aloe drug, i.e. the juice pressed from the leaves, whose Greek name ἀλόη was borrowed by the Arab pharmacologists as *āluwē*. In the West, the name apparently was pronounced *ṣibar*, which survives in Spanish *acibar*. Among the numerous varieties of the aloe, three are generally mentioned: *sukuṭrī, ʿarabī* (*ḥaḍramī*), and *simindjānī* (the latter reading is uncertain; it is perhaps derived from Simindjān in Ṭukhāristān). The first variety is considered to be the best and probably corresponds with the *Aloe Paryi* Baker, the *Aloe Socotrina*, which thrives in great quantities on the island of Socotra (Suḳuṭrā). The leaves, which are full of water, are squeezed, chopped up and pounded until the juice comes out. This is left to thicken, placed in a dish and exposed to the sun until it dries up. The juice resembles that of saffron, its scent that of myrh. The entire plant has a sharp odour and a very bitter taste. It has only one root. The drug was used above all as laxative, as an amarum or appetiser and as a choleretic; externally, it was applied on badly healing wounds, ulcers and burns; it was also used against inflamations of the eye, and as a means to improve bad breath.

(A. Dietrich)

Camphor

In Arabic *kāfūr* (also *ḳāfūr, ḳaf(f)ūr*); from Hindu *karpūra, kappūra*, Malayan *kapur*), camphor, the white, translucent substance which is distilled together with camphor oil from the wood of the camphor tree (*Cinnamomum camphora*) indigenous to east Asia (China, Formosa, Japan); it is to be distinguished from the Borneo camphor derived from *Dryobalanops aromatica* coming from Indonesia (Sumatra, Borneo). Both kinds were used as perfumes and medicines, but the latter, according to the Muslim sources native to Fanṣūr (Ḳanṣūr, Faiṣūr, and variants) in Sumatra, production of which must have been greater in the Middle Ages than today, was much more expensive and efficacious than the East Asian variety; according to Marco Polo it was worth its weight in gold.

Camphor seems to have been unknown to Greek and Roman antiquity, but in the Near East, by Sāsānid times at the latest, it was used as spice and perfume; when the Arabs conquered Ctesiphon in 16/637, they found there rich stores of camphor, which they thought was salt. It was also known in ancient Arabia, for according to Ḳurʾān LXXVI, 5, devout Muslims are refreshed in paradise with a drink flavoured with camphor. Camphor was known to ancient Arabic poets, at least by name; it is often put metonymically with musk (*misk*) as a symbol of the opposition of white and black.

The technology of camphor, its provenance, extraction, preservation, utilisation etc., is fairly comprehensively described by the geographers and cosmographers. The camphor tree grew on river banks and became so large that it could give shade to a hundred men. In general it was dealt with as follows: the bark was cut so that the resin ran out. It was collected in large vessels and kept cool. In so far

as the camphor tree was usually in areas infested by tigers (*numūr*, several mss. mistakenly *nusūr*, "eagles"), the resin could only be obtained at fixed times of the year when the tigers had dispersed. The wood is described as white, soft and very light. After the drawing off of the resin, the tree dies off. The diverging descriptions in the sources imply no contradiction, but only different procedures existing side by side.

The main significance of camphor lay however in its officinal uses. Already al-Kindī (*The Medical Formulary or Aqrābadhīn*, tr. M. Levey, 1966) brought together a series of camphor recipes useful for swollen liver, complaints of the larynx, inflammations of the mucous membrane of the mouth, and so on. The same author, or one of his pupils, composed a document about the production of fragrant oils and salves by means of "heightenings" (*taṣʿīdāt*, primitive distillations), in which camphor played an important part. Camphor is useful as a source of perfume, as a compress for acute fevers, headache, etc. By far the most exhaustive description, together with a statement of his sources, is provided by Ibn al-Bayṭār.

(A. Dietrich)

Bamboo

Ṭabāshīr is a medicament used in mediaeval Islam. It is a crystalline concretion in the internodes of the bamboo (*Bambusa arundinacea Willd., Gramineae*). The concretions, also known as "bamboo sugar", consist of silicic acid, silicates, and carbonate of calcium. They are extracted by burning the bamboo stems, often also through auto-combustion due to the heat by mutual friction of the stems when moved by strong winds. Some believed the concretions to be burnt elephant bones; most likely this is just a falsification using elephant teeth. Falsifications were also done with the burnt bones of ram's heads, whenever the price for *ṭabāshīr*, which in its Indian place of origin was practically worthless, was higher in the outside world. Others consider *ṭabāshīr* to be the roots of "Indian cane" (*al-ḳaṣab al-hindī*). The white, light, and soft concretions which were easily crushed and pulverised were considered the best (according to others those with a blueish hue). The Indians held especially the "knots" (*ʿuḳad*) and the dirham-size disks inside the stems in high esteem. *Ṭabāshīr* had been part of the Indian *materia medica* as of old; the Persian- Arabic name is supposed to be a translation of a Sanskrit word.

The medicinal effects attributed to *ṭabāshīr* are manifold. Taken internally or externally, it is used against inflammations of the gall bladder; it fortifies the stomach, is efficacious against high fever and thirst, lowers the heat of the liver, is beneficial against ulcers, pustules, haemorrhoids, and stomatitis of children. It is astringent, tonic, and a mild expectorant due to its slight bitterness. It is beneficial against eye inflammations, fortifies the heart, calms down heart palpitations and soothes stomach troubles of all kinds. Its application is also recommended in cases of diarrhoea and chronic liver ailments.

(A. Dietrich)

Artemisia

Shīḥ (Ar., from Aramaic *sīḥā*) is the plant species Artemisia, *Compositae*.

The word was probably used by the Arabs as a collective noun for the some 200 types of this species, spread in the Mediterranean area and the temperate latitudes. These types occur as herbs and

shrubs, many of them being aromatic. In medicine, the herb and its ethereal oil as well as the blossoming buds and their ethereal oil are used mainly as aromaticum amarum, as a stomachic, digestive, carminative, choleretic drug, and the blossoming buds also as an anthelminthic. It was further used as spice in the kitchen and as a stimulus of appetite. The Arab authors note mainly the following types of Artemisia: 1. *Sh̲īḥ* in the specific meaning of *Artemisia iudaica L.*; 2. *Sārīfūn* (σέριφον), probably *A. maritima*; 3. *Ṭarkh̲ūn, A. dracunculus*, tarragon; 4. *Ḳayṣūm, A. abrotanum*, southernwood or "Old man"; 5. *Birind̲j̲āsaf, A. vulgaris*, mugwort, often identified with *ḳayṣūm*; 6. *Afsantīn* or *abū sh̲inth̲iyā*, the wormwood (absinth), *A. absinthium*; 7. (?) *A. arborescens*.

It should, however, be realised that the descriptions of plants hardly suffice for determining the types, because nomenclature and synonymy are so vague. The most accurate, yet inadequate, botanical description may be presented here by way of example. It is found in *Dioscurides triumphans* under the entry *arṭāmāsiyā* (ἀρτεμισία), where five types of *ḳayṣūm* are described: "One of its types has many twigs, which come forth from a single root, about one yard long. Its leaves are attached to the twigs at some distance from one another, resemble those of the small type of the anemone (*al-nuʿmān*), are denticulated (*mus̲h̲arraf*) on both sides and grow smaller and smaller the more they are found near the upper end. At the end of each twig there are yellow-coloured blossoms, round and closely connected like a bunch (*d̲j̲amāʿa*) of heads of absinth (*ruʾūs al-afsantīn*). They vary in smell from pleasantly to repulsively, and their taste is bitter. This type has roots like those of the white hellebore (*al-k̲h̲arbaḳ al-abyaḍ*). A second type ramifies already at the soil from a single root and rises about one yard. A third type buds three or four twigs from one single root, just one yard long, to which leaves are attached in the same way as they are to the blue stock (*al-k̲h̲īri al-azraḳ*). A fourth type grows in riverbeds and ponds. The fifth type has many twigs, ramifying from one single root, just about two yards long. Its leaves resemble those of the olive tree (*al- zaytūn*), white on the side turned towards the ground and green on the side turned upwards, but smaller than those of the olive tree. The first type is the common sage (*arṭāmāsiyā*), called in Spain *fasāṭāyun* (= *afsantīn*). The second is called *al-ʿabayth̲arān*, also named "the fox's basilicum" (*rayḥān al-th̲aʿālib*), the third is "the golden one" (*al-mud̲h̲ahhab*), the fourth is called in Romance *yund̲j̲a* (*juncia*). The fifth and last one is called *furubina* (Romance *flor de pena*), also "olive of the castles" (*zaytūnat al-ḥuṣūn*) and *abrūsh̲iyā* (ἀμβροσία), of which *al-mud̲h̲ahhab* is a type". The first type, with many twigs and a pungent odour, is probably *A. arborescens L.* The fourth type, with one twig, which grows in inland water, could be *A. campestris*. For one of the other types the widespread *A. vulgaris* is probably to be taken into account. As one can see, the description of the types mentioned follows a rather fixed scheme: outward appearance, twigs, roots, leaves, blossoms, then taste and odour.

The Arab authors give many details about the medicinal use of *sh̲īḥ*. It resembles absinth, but does not have the latter's astringent power. Taken with rice and honey, it kills intestinal worms. The Artemisia from the mountains (*al-sh̲īḥ al-d̲j̲abalī*) is bitter, divides and dissolves flatulence and is less astringent than absinth. Its ashes, taken with almond oil, are good for loss of hair (*dāʾ al-th̲aʿlab*). It makes the itch disappear (*al-ukla*), is good for laboured breathing and aids urination and menstruation.

(A. Dietrich)

4. Food, Medicine, and the Market

Market

1. In the traditional Arab world

Sūḳ (Ar.), market, is a loanword from Aramaic *sh̲ūḳā* with the same meaning. Like the French term *marché* and the English *market*, the Arabic word *sūḳ* has acquired a double meaning: it denotes both the commercial exchange of goods or services and the place in which this exchange is normally conducted. Analysis of the *sūḳ* is thus of interest to the economic and social historian as well as to the archaeologist and the urban topographer. The substantial textual documentation which is available has as yet been analysed only very partially and the phenomenon of the market, fundamental to the understanding of mediaeval Arab culture, has not, to the present writers' knowledge, been subjected to a thorough and comprehensive conceptual study.

Since the beginnings of urban civilisation in Mesopotamia and in Syria, from the third millennium onwards, the Middle East had seen the development of commercial activities, local and long distance. For Maxime Rodinson, the Arabic *sūḳ* could be associated with an ancient Semitic term, the Akkadian *sūḳu*, from a root evoking tightness (if *sūḳu* < *ṣūḳu*) and, in early Hebrew texts, with the term *sh̲ūḳ*, denoting streets and squares and used to translate the Greek ἀγορά and the Latin *forum*. Intermediate Jewish sources between the 3rd and 6th–7th centuries A.D. refer to various functionaries supervising the market in the Talmudic era. The function of market inspector had been inaugurated in Mesopotamia, and the Greek term had passed into the Aramaic language of the Jews of Babylon and of Palestine where the Jewish authorities appointed agoranomes entitled to impose their own prices on the market.

The prominent role played by the market and its physical centrality in the Hellenistic and Roman world induced the state to take a keen interest in its workings. Thus attention may be drawn to the appearance, in Athens and elsewhere, of colleges of agoranomes, entrusted with supervision of the maintenance and good order of the agora, but above all responsible for checking the regularity of the transactions conducted there. The function of agoranome seems to have disappeared from Greek institutions 300 years before the Arab conquest. However, if a solution based on chronological continuity is to be rejected, the *ʿāmil ʿalā al-sūḳ*, or *walī al-sūḳ*, or *ṣāḥib al-sūḳ*, who appeared from the outset of Islam, in the time of Muḥammad, may be associated with the agoranomes of Palmyra of the 3rd century, who had a more exalted municipal function than simple market-policing and whom a bilingual inscription also calls *rabb sūḳ*. While agoranomy disappeared after the 3rd century, market inspectors continued, however, to operate in the adjacent world of Arabia. Regarding the five centuries which followed the Muslim conquest, there was a dispute between Claude Cahen and Eliyahu Ashtor over the question of the permanence of urban institutions, including control of the markets, in the Arab Orient.

It is also important to recall the importance of commercial activity for pre-Islamic and Islamic civilisation. The socio-economic structures of pre-Islamic Arabia are still inadequately known and have given rise to divergent interpretations, but the importance accorded there to the transport and exchange of merchandise seems clear. According to

Rodinson, several maritime *emporia* were in existence (Aden, ʿUmān, Ubulla), as well as temporary markets or fairs distributed throughout the year, *aswāḳ al-ʿArab*, although it is not known whether there was anything resembling a unified or regional organisation of such phenomena. M.A. Shaban followed Rodinson in writing: "It is impossible to think of Makka in terms other than trade; its only *raison d'être* was commerce". However, Patricia Crone has recently disputed the excessive importance attributed to Mecca as regulator of trade between Yemen and Syria. Excavations in the Arabian Peninsula have revealed conurbations including a group of three linked buildings: sanctuary, seat of power and market. Muslim tradition holds that Mecca was inhabited and controlled by merchants when the Prophet Muḥammad received there the revelation of the Ḳurʾān; the latter contains allusions to the coming and going of caravans and to the fairs which were held twice a year, close to the city.

On numerous occasions, it is evident that concepts deployed in the Ḳurʾān—which was initially addressed to the population of Mecca, a town occupied essentially by traders—assumed the existence of a "market" economy, especially in references to the relations between God and human beings, established in terms "of reckonings, of just and precise equivalences, of selling and buying"; thus God has "bought from the believers their selves and their goods in exchange for Paradise" (Ḳurʾān, IX, 112). The Prophet himself disconcerted the Ḳuraysh with his preaching in markets (XXV, 8). After the seizure of Mecca, Muḥammad is said to have appointed in this place Saʿīd b. Saʿīd b. al-ʿĀṣ to serve as *ʿāmil ʿalā al-sūḳ*. There were also numerous *sūḳ*s in Medina when the Prophet established himself there; their style of organisation remains entirely unknown, but the names of some of them have been preserved, in particular those belonging to the Banū Ḳaynuḳāʿ. In the time of Muḥammad, women exercised the function of *ʿāmila ʿalā al-sūḳ*, possibly because the majority of shoppers were also women. An incident in the life of the Prophet involves the arrival of Banū Sulaym nomads from the neighbourhood, bringing butter and livestock for trade. It is known furthermore that Muḥammad designated an open space as a *sūḳ*, forbade any building work on this site, and even had tents erected there.

The obligations imposed by God on his creatures, as well as the relations which God requires human beings to uphold among themselves—marriage, repudiation, inheritance, exchange of goods or services, recognition of the power of a political leader—are presented according to a general pattern comparable to that of commercial contracts, clearly committing the two parties, according to strictly codified formulae. The mechanisms of the "market", taken in the broadest sense of the term, thus play a fundamental role. "Ideology attributes to the market a supreme dominance over life on this earth," Rodinson writes, quoting Ghazālī, who compares a spiritual with a material market: "Let the *sūḳ* of this world below do no injury to the *sūḳ* of the Hereafter, and the *sūḳ*s of the Hereafter are the mosques". This enables him to conclude: "The Muslim economy is essentially a market economy. It celebrates the triumph of the market, extending for the first time over a substantial area of the earth's surface". The Arabs created the first "common market" covering an enormous space, stretching from the shores of the Atlantic to the frontiers of China, from the estuaries of the Volga to the Sahara, constructed on a unity which was initially political, then cultural, creating an institu-

tional identity from one end to the other of the *Dār al- Islām*.

It is reasonable to speculate on the extent to which the pro-commercial ideology of the new conquerors directly influenced their urban policy in captured or newly-established towns. P. Chalmeta stresses the importance of the building of *sūḳ*s at the orders of Hishām b. ʿAbd al-Malik: according to him, it was this period which saw clear evolution towards what is now recognisable as the *sūḳ*, and its ultimate transformation into the constructed *sūḳ*, an enclosure with gates, with permanent shops (*ḥānūt*), a base for the levying of taxes. H. Kennedy relies on the results of the excavation of a presumed Umayyad *sūḳ* at Palmyra in proposing the notion that the steppe region became, with the Arab conquest, a place of revived commercial activity after a late Byzantine phase of stagnation.

The desert was henceforward an active space, bordered by points which could be animated, among other activities, by commerce. An obvious point of reference here is the work of O. Grabar, *City in the desert*, Harvard 1978. The article by Roll and Ayalon, *The market street at Apollonia-Arsuf*, in *BASOR*, (1987), 61–76 describes a town of regional importance, the only harbour serving a quite extensive hinterland, where the elements of a *sūḳ* have been established: a narrow commercial street 2.5 m wide by 65 m in length, within the fortified town, which was apparently in use from the late 7th/early 8th century, where Umayyad coins have been found. In sum, however, in the absence of publications in sufficient number on the Umayyad period and of firmly- established chronologies, questions remain unanswered, especially for major cities such as Aleppo and Damascus where the transformation of the large central avenues into a *sūḳ* follows a chronology which, since the work of Sauvaget.

These urban transformations have an undeniable religious, social and judicial dimension. In the Arabo- Muslim world of the first five centuries, one of the most respected functions was that of the merchant/disseminator of *ḥadīṯ*, who enabled all the inhabitants of this region to acquire the same access both to the commodities of material culture and to the fundamental elements of religious culture. In mediaeval Arabic literature, religious as well as secular, the travelling merchant plays a predominant role: he transports the goods which he buys or sells from one market to another, between the time of the dawn prayer and the time of the midday prayer. Similarly, he memorises or diffuses prophetic traditions, from one mosque to another, between the afternoon prayer and the final prayer. The *ḥisba*, a branch of Islamic legislation precisely defining the functions of the *muḥtasib*, a civilian official appointed by the *ḳāḍī* to uphold Islamic order in the town and, in particular, to supervise the markets, is well understood, since numerous texts concerning it, often very concrete and practical, have been preserved. As will be seen especially with regard to the towns of the Muslim West, these documents make it possible to follow the daily functioning of the *sūḳ*.

Whether it was a case of ancient cities captured by the Arabs or newly-founded ones, all maintained certain similar, essential functions. The pattern of organisation of these large urban areas is well known: in the centre of the city, the *ḏjāmiʿ*-mosque and the governor's palace, *dār al-imāra*, constituted a local outpost of caliphal authority, communal prayer, upholding of Muslim order and levying of fiscal revenues. These buildings/institutions symbolised the town, a space for mediation between Arab tribes belonging to traditionally mutually hostile confederations, or between Arab Muslims and converted

mawālī, or even between the various officially recognised religious communities, Muslims and *dh*imm*ī*s. Immediately adjacent to the centre, along thoroughfares radiating from this nucleus and delimiting homogeneous areas, the *sūḳ*s supplied the third function of these cities, being the provider of wealth, of the exchange of goods and services. These *sūḳ*s comprised a series of broadly similar booths established on a segment of the road, deployed on one or on both sides of the latter according to the type of commercial activity and of product. These booths, of little depth, were fronted on the street by a bench: they could be overlooked by residential areas or separated by a rearward wall from such zones. The latter could accommodate the family of the trader or the artisan, but in general there was no access between them and the shop and they were occupied by families unrelated to the user of the premises.

In general, each type of commerce was concentrated on both sides of one of the radial routes linking the central square to each of the gates, a sector to which it gave its name. Traditionally, close to the Great Mosque, in the heart of the city, were located the sellers of manuscripts and the copyists, *kutubī*; suppliers of perfumes, *ʿaṭṭār*, and of fine leather, slippers and furs; and trades associated with precious metals; changers, *ṣarrāf*, goldsmiths, jewellers, *ṣāʾigh*, *djawharī*, trades often practised by Christian or Jewish artisans. Large central markets sold quality fabrics and items of clothing. Closer to the gates were those practising noisier crafts: carpenters, joiners and manufacturers of copper or brass objects, the latter often being Jews or Christians. Close by the gates of the citadel were saddlers and the sellers of weapons, such as swords, sabres, lances, bows and quivers. In the section of the town easily accessible to Bedouins, there were sellers of felt or cloth for tents, ropes, fur-lined capes, utensils and all other essentials for living in the steppe-lands. Located outside the city were those businesses which required abundant space or easy access to running water, or those which were dirty and malodorous: fullers, dyers, tanners, potters, wholesalers of fruit and vegetables, *sūḳ al- biṭṭīkh*, traders in sheep, horses, donkeys, mules, and camels.

Besides these linear *sūḳ*s, there existed agglomerations located in the enclosed structures of a continuous wall, breached by an easily-controlled monumental gate, structures of one or two storeys, surrounding a space open to the sky. Often of considerable size these buildings were denoted by various terms: *ḳaysāriyya* (imperial establishment for the protection of stages on major commercial routes), *funduḳ* (hostel, *fondaco*, place for the lodging of visitors to the town), *khān*, *wakāla* (meeting-place for commercial agents), *rabʿ* (facilities for temporary accommodation concentrated in a single building), *ḥawsh* (enclosed area, urban or suburban, of rural aspect, a yard of beaten earth, where cattle or poor immigrants could be accommodated) and when situated away from towns, isolated on commercial routes, *karawānsarāy* (from the Persian "caravan" and "palace", caravanserai).

Large in scale, supplied with lodgings, stables, sometimes with a mosque and a public bath, and comprising substantial warehouses, *makhzan*, *ḥāṣil*, the *ḳaysāriyyas* could maintain a high level of bulk trading, storage and processing by means of the workshops often located on the site. Situated either outside or within the city, close to a gate or linked to it by a well-proportioned street, these massive structures could be easily reached by heavily-laden dromedaries. The merchandise, resold semi- wholesale or retail, was distributed, outside these enclosed markets, through

the narrow streets of the city, transported by donkeys or porters. These enclosures, set apart for a series of well-defined and restricted commercial or industrial activities, provided governments with an easy framework for operating fiscal levies, and the single gate, which could be locked, made it possible during the night to segregate transients from resident citizens. They were in fact the forerunners of customs offices. In Fusṭāṭ, from the Fātimid period onward, sales outlets specialising in the commerce of cheese, carpets, eggs or jewellery were leased on behalf of such a *dīwān* supplying the financial needs of Kutāmī Berber soldiers or other social groups.

Foodstuffs harvested on the land adjacent to the towns, often processed in urban or suburban workshops, were introduced into networks of exchange covering a vast expanse between the Atlantic and Central Asia, while merchandise originating from other horizons was offered to local consumers. The *sūḳ*, like the *ḳaysāriyya*, was thus the indispensable link between the city, its neighbouring territory and the *Dār al-Islām.* What is not properly understood is the mode of interaction between these *sūḳ*s and other urban commercial institutions, and those market sites which were temporary, mostly rural and located outside the town. Mediaeval geographers often refer to the rural markets of the Maghrib; thus al-Idrīsī, describing the still very fragmentary structure of Meknès in the period prior to his own time, indicates that at a certain distance from the nuclei of population, in the process of transforming themselves into a town, there existed an ancient rural market site, still functioning, called *al-sūḳ al-ḳadīma*, "a flourishing market to which people come from near and far every Thursday and where all the tribes of the Banū Miknās are gathered".

Whatever may have been the importance of places of rural exchange (and it must again be stressed that very little is known on the subject), the Muslim travellers of the Middle Ages who describe the towns of the *Dār al-Islām* define them principally by the presence of a great mosque and of markets. In the eyes of the peasantry of the regions surrounding the town, it is also, apparently, the market which constitutes its most specific element. Thus—outside the Arab domain—P. Centlivres notes that the country folk living in the villages situated in the environs of Tāshḳurghān, in Afghānistān, refer to the town itself, in its entirety, by the term *bāzār*, synonym of *sūḳ*. In certain towns of the Maghrib, merchants are forbidden to conclude, except within the confines of the market and during its times of functioning, any transaction with peasants from the neighbourhood of the town; this is for the economic protection of the producer against the malice of a buyer operating outside the normal framework of competition.

According to their range of activity or the circles in which they operate, it is possible to distinguish between different types of merchants and of "markets": Chalmeta places in totally different categories the shopkeeper (*ḥawāntī*) and the major trader (*tādjir*), corresponding to two quite distinct economic circuits. The Fāṭimid-period author al-Dimashḳī identifies the *khazzān*, the sedentary merchant who, by means of stocking or destocking, plays on variations of price as influenced by space, time and the quantities of the commodities traded; the *rakkād*, the itinerant trader who owes his profits to his knowledge of the differences in purchase and sale prices according to the places where the transactions take place; and the *mudjahhiz*, the purveyor, who supplies travellers with all that they need. Thus I. Lapidus stresses,

in Mamlūk Egypt, the independence of the local and long-distance commercial circuits, the latter continuing to prosper while the former declined. At the risk of over-simplification, it should be possible first to define the "shopkeeper", dealing in local products, living in a universe of limited intellectual and economic horizons. In ʿAbbāsid Baghdād, this class of shopkeepers, with its thoroughly practical daily concerns, seems often to have been inspired by Ḥanbalism. The larger traders, sedentary wholesalers or travelling merchants, capable of more complex economic calculations since they need to take into account the risks of long-distance transport were attracted by Shāfiʿism, Ashʿarism, or eventually Ismāʿīlism in the East, Mālikism or Khāridjism in the West. Major financiers close to the centres of power, juggling with substantial abstract sums, tended rather towards Ḥanafism or Twelver Shīʿism or even Ismāʿīlism.

(Th. Bianquis, P. Guichard)

2. In the Muslim West

In the Occident as well, the geographers refer to the countless *sūḳ*s which constituted the commercial heart of Muslim towns in all western regions. The diversity of these *sūḳ*s is well illustrated, for example, by Ibn Ḥawḳal, in the description which he provides of the markets of Palermo in the 4th/10th century, for which he lists some twenty-five different specialities (traders in oil, corn, fish, meat and vegetables, smiths, apothecaries, money-changers, drysalters, cobblers, tanners, joiners, potters, embroiderers, polishers, etc.). Regarding the late Middle Ages, the index of Brunschvig's survey of Ḥafṣid Tunisia names some fifty different *sūḳ*s. It would seem to be appropriate to seek out, through detailed study of a town such as Fez on the eve of the colonial period, the still vibrant modern echo of these ancient structures. It is evident that cities of the western Mediterranean linked to the Muslim world were remodelled according to patterns emanating from the East, or were constructed according to the same principles in the case of new foundations.

As regards the Maghrib, it is however somewhat difficult to glean precise information on the topographical and economic organisation of *sūḳ*s in the Middle Ages. It is known that at al- Ḳayrawān, before the Fāṭimids transferred commercial activities to Ṣabra Manṣūriyya, the sector of the *sūḳ*s extended along the Simāt, a main street which, traversing the whole city from gate to gate, skirting the Great Mosque and fringed by two rows of shops, served as the city's principal thoroughfare. In 275/888–9, at the time of the "insurrection of the dirhams", following a monetary reform ordered by the Aghlabid Ibrāhīm II, the traders closed their shops and rose in revolt. Also for the 3rd/9th century in Ifrīḳiyya, a very interesting source exists, the *Aḥkām al-sūḳ* of Yaḥyā b. ʿUmar, containing a wealth of detail regarding the daily life of the *sūḳ*. But besides this compilation of judicial consultations relating to the *sūḳ*, Maghribī literature specifically concerning markets is rather meagre, and it would be necessary, for a clear understanding of the market economy in the mediaeval Maghrib, to gather together a very dispersed and often allusive stock of documentation, since the sources currently available do not seem to allocate much importance to the "market".

In his synthesis of the politico-administrative institutions of the mediaeval Maghrib, Hopkins supplies very little information on the administration of the market. The paucity of references to the specific jurisdiction of the *ḥisba* even leads him to believe that it was in fact the

ḳāḍī who directly assumed the function of *muḥtasib*. Sometimes, the latter would even have been the personal prerogative of the sovereign himself: twice a month, the Almohad caliph Abū Yaʿḳūb Yūsuf is supposed to have called together the *umanāʾ* (s. *amīn*) responsible for each of the professions to report to him on the state of the markets. The sources do, however, mention at about the same time a *muḥtasib* of Marrakesh.

In his study of Zīrid Ifrīḳiya, Idris makes virtually no mention of magistrates being in charge of a single market, which in his opinion was the responsibility of a kind of secondary judge, distinct from the *ḳāḍī* and called *ḥākim*, probably exercising supervision over the *umanāʾ* responsible for the different professions, or a *nāẓir al-sūḳ*, mentioned in a document of 430/1038. Besides a fairly thorough nomenclature (names of *sūḳ*s, straightforward mention of the *sūḳ*s of such and such a locality), *sūḳ*s, as a concrete reality, appear hardly at all in Brunschvig's survey of Ḥafṣid Tunisia, although there is mention there of the creation of markets by sovereigns, and details of the revenues levied by the state on the different markets in the mid-8th/14th century. But under the Ḥafṣids, the role of the *muḥtasib*, if indeed it existed, had little importance. Regarding the late Middle Ages, the *Risāla fi 'l-ḥisba* of al-Ḏjārsifī, which dates from *ca.* 700/1300, nevertheless gives an interesting insight into the life of the urban proletariat of the *sūḳ*s in the towns of the western Maghrib, if, as Chalmeta believes, the work was indeed written in Fez or in Tlemcen and not in the Naṣrid kingdom as has also been suggested.

The situation in al-Andalus is quite different from that of the Maghrib. There the *sūḳ*s are in fact one of the better understood aspects of the economic history of the country, illuminated as they are by numerous texts of *ḥisba*. This type of source appears to be an Andalusian speciality, taking account of the fact that Yaḥyā b. ʿUmar, cited above, was of Andalusian origin, considering also the doubts which remain over the geographical localisation of the work of al-Ḏjārsifī. Information regarding Cordova is, however, not perhaps quite as precise, or abundant (in particular from a topographical and institutional point of view) as could be hoped. The description of the *sūḳ*s of the caliphal capital supplied by Lévi-Provençal is very general and is based principally on his knowledge of the "traditional city" in western (Maghribī) Islam, and on data gleaned from manuals of *ḥisba* of which only one, the *Risāla* of Ibn ʿAbd al-Raʾūf, dates from the caliphal period. A useful point emerging from this survey is the indication that the corporative system, which is thought to have operated in towns of the ʿAbbāsid East, did not exist in al-Andalus: there were no professional "corporations" as such, only *amīns* or *ʿārifs* recognised by the authorities and serving as responsible intermediaries between them and each profession. Chalmeta's fundamental work supplies much more abundant information.

Besides the information, perhaps rather theoretical, which may be drawn from it regarding the jurisdiction of the *ṣāḥib al-sūḳ/muḥtasib* of caliphal Cordova (relating to the supervision of prayer, marriages, etc.), the *Risāla fī adab al- ḥisba* by Ibn ʿAbd al-Raʾūf provides some interesting details concerning the regulation of the *sūḳ*s of Cordova in the 4th/10th century, weights and measures and the types of fraud likely to be committed by artisans and merchants. But the two most important texts for the study of the *sūḳ* in al-Andalus are: the *Risāla fi 'l-ḳaḍāʾ wa 'l-ḥisba* by Ibn ʿAbdūn, which contains a wealth of detail regarding control of the market

of Seville *ca.* 1100 A.D., and the *Kitāb fī adab al-ḥisba* by al- Saḳaṭī, which supplies similar information regarding Malaga of about a century later. All of these texts, which cover norms of activity for those responsible for the market, the regulations which they are expected to apply and safeguards against the more blatant forms of fraud, are more concerned with the control of professions and the policing of the market, thus its functioning and practical reality, than with the broader function of the *ḥisba*.

This seems to be due to the specifics of this control of the market in al-Andalus, where the Umayyad tradition seems to have preserved, better than was the case in the ʿAbbāsid East, a post for the policing of commercial activities, the one responsible retaining the title of *walī al-sūḳ* or *ṣāḥib al-sūḳ*. There is no doubt of the existence of a particular magistrate entrusted with the *wilāyat al-sūḳ*, distinct from the *wilāyat al-madīna* since the time of ʿAbd al-Raḥman II (206–38/822–52). Information is available concerning numerous jurists who exercised this function, which was closely involved with the practical regulation of economic life, and constituted one of the echelons of a kind of *cursus honorum* of magistratures and senior official posts (Ibn ʿAbd al-Raʾūf, for example, seems to have been successively *ṣāḥib al-sūḳ*, *wālī al-madīna*, then *wazīr*). For P. Chalmeta, confusion with the *ḥisba* was a late and rather deliberate development in al-Andalus, and among the populace, the functionary entrusted with this role was still seen primarily as "controller of the market". The later treatise, that of al-Saḳaṭī, is also the more precise and more vivid in regard to the ingenuity of fraudulent practices, the composition and manufacture of products: it provides an exceptionally clear insight into the daily life of a *sūḳ* which seems principally devoted to the promotion of a multiplicity of small and highly specialised businesses.

The Andalusian treatises often paint a detailed and colourful picture of a world of impecunious small tradesmen and rogues, seeming to exist on the very edge of survival. They have little to say of higher-level commercial activities, and are almost silent on the subject of costly merchandise (where luxury products are mentioned, it is their manufacture which is described, rather than their marketing). Chalmeta draws a firm distinction between the closed world of small artisans and merchants of the *sūḳ* as such, defined by him as *ḥawāntī*, and the much more open one of the major traders, *tud̲j̲d̲j̲ār*, who were not, in his opinion, subject to the jurisdiction of the *ṣāḥib al-sūḳ*. He stresses the separation of the two commercial circuits, local and long distance, which in his view had very little in the way of coordination or interaction with each other, and even developed in divergent directions. In her study of commerce—and particularly large-scale commerce—in al-Andalus, O.R. Constable, while slightly modifying the notion of the non-intervention of the *ṣāḥib al-sūḳ* in long distance commerce (in areas such as the supervision of vessels and of ports), agrees that texts dealing with control of the Andalusian *sūḳ* leave aside almost entirely precious products, major commerce and major traders. She believes that others were entrusted with this charge, but concedes that the sources say virtually nothing on the subject. It would probably be necessary to distinguish between different types of town.

It would be helpful to have a better knowledge of the precise geography of the places, in the city, where commercial activities were practised. The *sūḳ* in the strict sense, the *ḳaysāriyya*s, *funduḳ*s, open markets, certainly also played an important role, without counting the extramural

and rural markets, which are often evoked but of which virtually nothing is known. A systematic analysis of texts of all kinds would perhaps facilitate a more accurate identification of the places where different types of commercial transaction were concluded.

Reference has been made above to a list of the revenues of different sales locations in Tunis in the 14th century cited by Brunschvig: it emphasises the meagre revenue of *sūḳ*s as such in comparison with the receipts earned by markets in public places and by *funduḳ*s. But a more precise analysis of commercial activities as a whole and of the *sūḳ* as a physical commercial site often remains unattainable, in the absence of effective archives. Reference may be made for example to a judicial review conducted by a *wazīr ṣāḥib al-aḥkām wa 'l-sūḳ* of Cordova who, in 458/1066, intervened in a transaction involving a company consisting of two brothers, one based in Cordova and the other in Fez, who were in dispute with a third party to whom they had forwarded a number of dīnārs as payment for the manufacture on their behalf of ten pieces of silk, apparently for export. This would seem to contradict the notion expressed above that long-distance trade was immune from the jurisdiction of the *ṣāḥib al-sūḳ*, but this is only one particular case among many others which should be cited.

(P. Guichard)

3. In mediaeval ʿIrāḳ

Before the Arab conquest of ʿIrāḳ there were markets frequented by Arabs in ancient cities, such as al-Ḥīra and al-Madāʾin. There was also a so-called "sūḳ Baghdād" on the west bank of the Tigris, where a monthly market was held during the Sāsānid period. The latter was raided by Arab troops as early as the caliphate of Abū Bakr. Following the Arab conquest of ʿIrāḳ, the founders of the garrison towns of Baṣra and Ḳūfa designated an open space close to the mosque for use as a market. In this they were emulating the Prophet Muḥammad who had designated an open space in Medina for a similar use. A distinctive method in the organisation of markets began to emerge in the new Islamic cities of Wāsiṭ, Baghdād and Sāmarrāʾ during the late Umayyad and early ʿAbbāsid periods. Evidence from the ʿAbbāsid period suggests that there were often a series of markets (*aswāḳ*) adjacent to each other and separated only by roads and streets. Outside the central market in Baghdād and Sāmarrāʾ, other markets were created for local residents and there were also a number of smaller markets known by the diminutive *suwayḳa*.

Markets, according to al-Shayzarī (d. 589/1193), author of the earliest *ḥisba* manual, should be as spacious and wide as possible (like the Roman market), and every kind of craft or profession (*ṣanʿa*) represented in it should be allocated its own market (*sūḳ*). The reference to separate space for each product sold or manufactured probably implies a series of markets or a row of shops and workshops producing and selling similar goods. Thus al-Shayzarī recommends that a market should allocate space to a concentration of shops selling the same product. The shops were arranged in a linear fashion along roads, streets and lanes. The author further recommends that traders who used fire in the preparation of their products, such as bakers (*khabbāʿūn*), cooks (*ṭabbākhūn*) and blacksmiths (*ḥaddādūn*) should for safety reasons have their shops at some distance from others, for instance, perfumers (*ʿaṭṭārūn*) and cloth merchants (*bazzāzūn*). A similar market layout was endorsed by Ibn Bassām al-Muḥtasib.

Other principles applied to the organisation of shops in a market took into account nontopographical considerations. For instance, Ibn al-Djawzī (d. 597/1200), writing about the markets of Baghdād, noted that in the markets of al-Karkh the perfumers did not associate with traders selling noisome goods nor with sellers of fancy or of secondhand goods. People of refined culture lived in special residential areas. No working-class people lived in the Saffron Road (*darb al-zaʿfarān*) in Karkh; the only residents there were the cloth merchants and perfume traders. The segregation of the traders in products that smelled nice (perfumes, sweets, jewellery, silk cloth, etc.) from those dealing in smelly things, such as tanners, dyers, garbage collectors and bric-à-brac merchants, was a principle which seems to have been widely applied in laying out these markets. Such social custom, according to Massignon, was responsible for the practice of housing the markets of the jewellers (*sūḳ al-ṣāgha*) with those of the money-changers (*sūḳ al-ṣayārif*). Another reason for grouping the shops of jewellers and money-changers together was probably the fact that these commercial enterprises were monopolised by Jews and Christians.

Al-Shayzarī's views on the topographical organisation of markets, in which shops and workshops were grouped together for manufacturing or selling similar goods, reflect the broadly-accepted principles followed by Arab town-planners in the early Islamic period. Our knowledge of the early ʿIrāḳī markets goes back to the 1st/7th century, when Baṣra and Kūfa were laid out using these principles, according to al-Ṭabarī.

Baṣra was founded in 16/637 on the site of the base camp established by ʿUtba b. Ghazwān, whose first action was to select the site of the mosque. At the same time, Bilāl b. Abī Burda marked out a makeshift market, which was gradually expanded, thus contributing to Baṣra's success as a trading centre.

It seems that a site for the town's market was not originally allocated. The governor ʿAbd Allāh b. ʿĀmir later chose a particular site, which came to be known as *sūḳ ʿAbd Allāh*. His successor Ziyād b. Abīhi encouraged the settlers to establish a permanent market. The *sūḳ ʿAbd Allāh*, which was located within the residential quarters, proved inadequate for a rising population, and the old market was transferred to the Bilāl canal (*nahr Bilāl*). Most of the early markets of Baṣra were on designated open space, and permanent shops (*ḥānūt*) were not built until the 3rd/9th century.

During the 1st–2nd/7th–8th centuries Baṣra's markets selling specialised wares were located in a single space or road; for instance, the leather market (*sūḳ al-dabbāghīn* (lit. tanners' market), the camel market (*sūḳ al-ibl*), market of the straw sellers (*sūḳ al-tabbānīn*) and the locksmith's market (*sūḳ al-ḳaffālin*). The Mirbad market was situated at the caravan station on the edge of the desert, where town-dwellers and Bedouin gathered to sell camels and other animals and to listen to poets reciting poems and orators speaking on current affairs. By the 3rd–4th/9th–10th centuries, the great market (*sūḳ al-kabīr*) was located at the junction between the Maʿḳil Canal and the Ibn ʿUmar Canal, where a variety of products, including glassware, bottles, combs, textiles, cooked food, flour, fish, fruits and vegetables were sold. Carpenters and tailors also had their shops there. The shore market (*sūḳ al-kallā*) lay in the residential area along the Fayl canal. It also had a food market (*sūḳ al-ṭʿām*), which sold flour, rice, dates, meat, vinegar and secondhand goods. In addition, there was a money-

changers' market, a goldsmiths' market and a slave market (*sūḳ al-nakhkhāsīn*).

Baṣra's trade with foreign merchants was conducted through the ancient port of al-Ubulla, which was linked to the garrison city through a canal dug by Ziyād b. Abīhi. One traveller noted in 443/1051 that al-Ubulla was located to the southwest of Baṣra, and the Shaṭṭ al-ʿArab lay to the east of this port, which had thriving markets, caravanserais, mosques and luxury villas. The Ubulla canal was busy with boats carrying merchandise to and from Baṣra. Nāṣir-i Khusraw visited the city in the mid-5th/11th century and found that Baṣra's markets opened for business at different times of the day. For instance, a morning market was held at *sūḳ al-Khuzāʿa*, a mid-day one at *sūḳ ʿUthmān* and a late-afternoon one at *sūḳ al-kaddāḥin* (the flintmakers' market).

Kūfa, which was founded shortly after Baṣra, was a better planned town. However, al-Ṭabarī does not specify the sites of its markets. Ḳūfa began with an open-air market. ʿAlī b. Abī Ṭālib, who moved his capital from Medina to Ḳūfa, is reported to have said "For the Muslims, the market is similar to the place of worship: he who arrives first can hold his seat all day until he leaves it". The same theory that a seller had a right to a space in the market was upheld by the governors al-Mughīra b. Shuʿba and Ziyād b. Abīhi, who held that a trader who sat in a specific space in a market place could claim the spot so long as he occupied it. This suggests that no permanent shops were built in the market of Kūfa during the early Umayyad period and that these were only erected during the caliphate of Hishām by Khālid b. ʿAbd Allāh al-Ḳaṣrī. Endorsing al-Balādhurī's statement, al-Yaʿḳūbī affirms that Khālid al-Ḳaṣrī built markets and constructed a room and an arch (*ṭāḳ*) for every trader. Yāḳūt, on the other hand, recorded that the Asad Market (*sūḳ Asad*) built at this time in Ḳūfa was the work of Asad b. ʿAbd Allāh al-Ḳaṣrī. Setting up a temporary stall/shop in a market incurred no tax during the 1st/7th century.

According to one account, artisans and craftsmen worked in an open space near the central mosque. Al-Djāḥiẓ recorded that much of Ḳūfa was in ruins in his time. Moreover, the cost of living was higher in Ḳūfa than in Baṣra. For instance, building a house in Ḳūfa or Baghdād cost 100,000 dirhams, whereas a similar house in Baṣra cost half as much. According to Massignon, the market in Ḳūfa during the 3rd–4th/9th–10th centuries, included the following craftsmen: the book and paper-sellers were sited on the *ḳibla* side of the city's major mosque; other crafts nearby included datesellers (*tammārūn*), the manufacturers and sellers of soap (*aṣḥāb al-ṣābūn*) and grocers (*baḳḳālūn*). There were also carpet-sellers (*aṣḥāb al-anmāṭ*) and cloth merchants; laundrymen (*kaṣṣārūn*) at Dār al-Walīd, butchers (*djazzārūn*) and wheat merchants (*ḥannātūn*); sellers of roast meat (*sawwāḳūn*); other merchants who were neighbours of the tradesmen were money-changers (*ṣayārifa*) and goldsmiths (*ṣayyāghūn*). The markets of Ḳūfa flourished throughout the ʿAbbāsid period, and after, according to Ibn Djubayr and Ḥamd Allāh al-Mustawfī, but details of commercial activities are lacking in most of our sources. While visiting Ḳūfa, the Spanish traveller Benjamin of Tudela (*ca.* 1173) reported that the Jewish population of about 70,000 had an impressive synagogue. These population figures were probably exaggerated; nevertheless, they remain significant. Jews in the mediaeval Middle East were well known for their commercial activities and their craftsmanship as jewellers, and were also famed as bankers and money-changers. Their presence in large numbers in the predominantly

Shīʿī city of Ḳūfa (only 2,000 Jews lived in Sunnī-dominated Baṣra) would tend to suggest that the former was still an important commercial centre in the late ʿAbbāsid period. But when Ibn Baṭṭūṭa (*ca.* 1325–54) visited Ḳūfa, he found that it was merely a caravan station for pilgrims from Mawṣil and Baghdād travelling to Mecca; the commercial city had fallen into ruins as a result of attacks by Bedouin. However, he found the neighbouring Nadjaf a populous town with a thriving market, admiring the fine and clean *sūḳ* which he entered through the Bāb al-Ḥaḍra. He then offers details of the layout of the Nadjaf *sūḳ*, beginning with the food and vegetable shops, markets of the greengrocers, cooks and butchers, the fruit market, the tailors' market, followed by the covered market (*ḳayṣariyya*) and the perfumers' bazaar, which was close to the alleged tomb of the Imām ʿAlī b Abī Ṭālib.

Al-Wāsiṭ was founded by al-Ḥadjdjādj, and its markets, according to the local historian Bahshal (d. 292/905), were well planned. The layout of the market allotted to every trade a separate plot of land and segregated each craft or trade. Each group of tradesmen was given its own money-changer. Iyās b. Muʿāwiya was appointed inspector of the Wāsiṭ market. A kind of toll or rent was collected from the tradesmen. The *sūḳ* was divided into two broad sections. On the right side of the market the shops of the food-sellers, cloth merchants, money-changers and perfume traders were located; on the left side, the greengrocers, fruit vendors (*aṣḥāb al-fākiha*) and sellers of second-hand goods (*aṣḥāb al-suḳaṭ*) established their shops or stalls. Day labourers (*ruzdjāriyyūn*) and craftsmen (*ṣunnāʿ*) waited for work on a space stretching from the sandal-makers' road (*ḍarb al-ḵharrāzūn*) towards the Tigris river. The market was thus an elaborately laid-out affair. This main market was on the western side of the town.

In planning a circular-shaped double-walled citadel city at Baghdād, with four massive arcaded gates, the ʿAbbāsid caliph al-Manṣūr was also responsible for laying out the city's markets in the arcaded space of the four city gates, following the practice of ancient cities such as Jerusalem. However, after ten years or so, Abū Djaʿfar is said to have been advised by a visiting envoy, the Patricius, from Byzantium that siting markets near his palace posed danger to a ruler from foreign spies visiting the markets in the guise of traders. Shortly before the removal of the markets from the arcades (measuring 15 × 200 cubits) of the four gates, there was a riot incited by a certain Yaḥyā b. ʿAbd Allāh, whom Abū Djaʿfar had appointed the city's *muḥtasib*, for which Yaḥyā was executed. Nevertheless, the emergence of the *muḥtasib* in Baghdād heralded the rise of this urban institution which regulated the ethical behaviour of traders and craftsmen in the ʿAbbāsid markets.

Following the riots of 157/774, the city's markets were transferred to the district of al-Karkh where shops and workshops were laid out on the principle of selling homogenous products in adjacent shops/stalls systematically arranged in rows of roads (*darb*, pl. *durūb*) and streets (*sikka*, pl. *sikak*). The markets of the butchers, who carried sharp tools, were allotted a space at the far end of the market. Thus according to al-Khaṭīb al-Baghdādī, al-Manṣūr instructed his officers Ibrāhīm b. Ḥubaysh al-Ḳūfī and Khirāsh b. al-Musayyab al-Yamanī to develop the central business district at al-Karkh on the west bank of the Tigris. Al-Manṣūr's successor al-Mahdī was later responsible for laying out the markets at the Bāb al-Ṭāḳ and Bāb al-Shaʿīr on the east bank of the Tigris, around the palace of Khuld, in the

Ruṣāfa district, and also for establishing the west bank markets in the Ḥarbiyya quarter to the north of the Round City. This quarter was inhabited by Central Asians, who traded with Khʷārazm and Transoxania. Both Ibn al-Faḳīh and al-Yaʿḳūbī describe the markets of Baghdād in the later 3rd/9th century and early 4th/10th century.

The markets in east Baghdād included the *sūḳ Yaḥyā* (named after Yaḥyā al-Barmakī). The land on which this market stood war later awarded by al-Maʾmūn to Ṭāhir b. al-Ḥusayn at the end of the civil war between the sons of Hārūn al-Rashīd. During the 5th/11th century, when the Saldjūḳs were controlling Baghdād, there were many reports of arson in the city's markets. In 485/1092 fire raged in the markets of the goldsmiths' and of the money-changers (*sūḳ al-ṣāgha wa 'l-ṣayārif*) resulting in great loss of life; and in 512/1118 the *sūḳ al-rayāḥīn* (the spice market) and the market of ʿAbdūn caught fire, resulting in extensive damage to property in east Baghdād, including the money-changers' shops, millers' inn, the royal mint (*dār al-ḍarb*) and public baths, all of which were destroyed. Ibn al-Djawzī describes the layout of east Baghdād's markets in the 6th/12th century, which contained high-rise buildings owned by rich merchants, such as the millers (*daḳḳāḳūn*), bakers and sellers of sweets (*ḥalwayiyyūn*). There was also a nearby shoe-makers' market (*sūḳ al-asākifa*), then a market selling all kinds of birds (*sūḳ al-ṭayr*), one for aromatic plants/spices, and in the vicinity of this lay the bankers' or money-changers' shops. Next came shops selling food (*sūḳ al-maʾkūl*), such as those of the bakers and butchers (*ḳaṣṣābūn*). Alongside them there was the goldsmiths' market housed in a most splendid building. Next to it, there was a big market of booksellers and copyists (*sūḳ al-warrāḳīn*) in which scholars and poets congregated. All these markets of east Baghdad were located close to the market of al-Ruṣāfa and its congregational mosque.

There was an element of competition in the setting up of *sūḳ*s. For instance, the *sūḳ al-ʿaṭash* (Thirst Market) formerly known as *suwaykat al-Ḥarashī* was built by Saʿīd al-Ḥarashī for al-Mahdī as a means of transferring some of the business to the east bank at the expense of al-Karkh. Among the smaller markets of east Baghdād were the *suwaykat Naṣr* (attributed to Naṣr b. Mālik), *suwaykat Khālid* (referring to Khālid b. Barmak) at the Shammāsiyya Gate, and *suwaykat al-Ḥadjdjādj* (related to al-Ḥadjdjādj b. Waṣīf, a client of al-Mahdī), and the *suwaykat Aḥmad b. Abī Khālid*. Similarly, west Baghdād had, besides the great markets of al-Karkh and al-Ḥarbiyya, many other markets, including the *sūḳ al-Haytham* (referring to al-Haytham b. Muʿāwiya), the *sūḳ ʿAbd al-Wahhāb* and the fruit market of *dār al-baṭṭīkh*. At Ḳaṣr Waḍḍāḥ, named after the client of the caliph who was in charge of the arsenal (*ṣāḥib khizānat al-ṣilāḥ*), there were markets selling all kinds of goods; these included over a hundred shops selling paper and books and the shops of copyists. These bookshops spread from the Ṭāḳ al-Ḥarrānī to the new bridge on the Sarāt Canal, occupying both sides of the road and on the bridge itself.

Al-Yaʿḳūbī states that, in his time, the market of al-Karkh occupied an area two *farsakh*s in length from Ḳaṣr Waḍḍāḥ to the *sūḳ al-thulātha* (Tuesday Market) and one *farsakh* from the Ḳaṭīʿat al-Rabīʿ towards the Tigris. Each trade was located in a well-known street and the shops and workshops were arranged in rows of shops. Craftsmen of one kind did not mix with another kind and were segregated from those of other markets, each market constituting a separate unit. The Ḥarb b.

ʿAbd Allāh Street was the largest street around which people from Balkh, Marw, Bukhārā, Khuttal, Kābul and Khʷārazm settled. In the same locality was located the *dār al-raḳīḳ*, where slaves were bought and sold under the supervision of al-Rabīʿ b. Yūnus. When the Andalusian traveller Ibn Djubayr visited Baghdād in the 6th/12th century, he found that the Ḥarbiyya markets and residential areas had declined. He also noted that the market of the hospital (*sūḳ al-māristān*) where physicians attended the sick every Monday and Thursday, was located at the old Baṣra Gate in west Baghdād. The shops and workshops of leather workers (*dabbāghūn*) were situated at the ʿĪsā Canal on the west bank of the Tigris away from the main market of al-Karkh, and not far from a rubbish dump (*kunāsa*) and an ancient graveyard. In 449/1057, a fire caused extensive damage to the food market (*sūḳ al-ṭaʿām*), the wood-sellers' market (*sūḳ al-khashshābīn*), the carpenters' market (*sūḳ al-nadjdjārīn*), the butchers' market (*sūḳ al-djazzārīn*), the dyers' market (*sūḳ al-ṣabbāghīn*) and the market of the perfumers and chemists (*sūḳ al-ʿaṭṭārīn*) which were sited in adjacent buildings.

On the east bank, construction for the palace of al-Khuld began in 143/760 for the prince al-Mahdī, and this had its own markets: the fief of Badr al-Waṣīf housed the *sūḳ al-ʿaṭash*; among the five streets in east Baghdād, there was a *sūḳ Khuḍayr*, where Chinese wares were sold. Rents collected from the markets during the 3rd/9th century on both banks of Baghdād, including those from the Mills of the Patricius (*arḥāʾ al-Baṭrīḳ*), amounted to 12 million dirhams annually. The traders in the markets of Baghdād imported goods from Central Asia and from the Far East as far as China, and al-Djāḥiẓ in his *K. al-Tabaṣṣur bi 'l-tidjāra* gives a list of exotic products available in ʿIrāḳ's markets.

When al-Muʿtaṣim built the city of Sāmarrāʾ, he followed the established pattern for earlier markets in Islamic cities such as Baghdād. After laying out the palace and public buildings, he marked out the site of the chief mosque and built the markets around it; the rows of shops and workshops were made spacious and every kind of product was sold in adjacent shops. In the north of Sāmarrāʾ some groups of Turkish soldiers were allotted land on which to build their houses, but the barracks of the Turks and the men of Farghāna were established far away from the markets so that these troops did not mix with local people and traders. Some folk were settled further north, in the area of al-Dūr, where small markets, some shops and butchers' stalls were built for the *muwalladūn*. The *ḳaṭīʿa* or fief of Ḥizām on which the slave market was situated, was near the guard headquarters and prison. Shops and rooms for housing slaves were located there, and on this main thoroughfare there were houses for the common people and markets where craft and product were sold separately. This was Sāmarrāʾ's second big market. Outside the old Sāmarrāʾ, al-Mutawakkil built a new satellite town, where all the traders of demeaning status, such as the sellers of barley beer, *harīsa* soup and wine (*aṣḥāb al-fuḳḳāʿ wa 'l-harāʾis wa 'l-sharāb*) were isolated from the rest of the market. Market taxes and rents (*ghalla wa-mustaghillāt*) collected in Sāmarrāʾ amounted to ten million dirhams a year.

Mawṣil also had its markets, and its Wednesday (*sūḳ al-arbaʿāʾ*) and Sunday Markets (*sūḳ al-aḥad*) were well known as early as the 2nd/8th century. The local historian al-Azdī mentions others markets, including the hay market (*sūḳ al-ḥashīsh*) and market of sellers of saddles stuffed with straw (*sūḳ al-ḳattābīn*) and food market. Al-Muḳaddasī noted that Mawṣil had

fine markets, which extended to the tanners' road and gypsum sellers' road (*darb al-ǧaṣṣāṣīn*). In the city's square (*murabbaʿa*), near the inns, was the Wednesday Market, where farm labourers (*akara*) and harvesters (*ḥawāṣid*) came from the surrounding countryside to seek temporary or seasonal work in the city. From Mawṣil's covered markets, provisions for Baghdād were transported by boats and caravans. Among other towns, al-Muḳaddasī cites Ḳaṣr Ibn Hubayra, which had a large concentration of weavers and Jews in a thriving market economy. At the same time, Tikrīt was a sizeable town, where a monastery provided the focal point for local Christian pilgrimage and many woollen workers settled there in order to meet the demands of the pilgrims.

(M.A.J. Beg)

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